Physician Information Environment of Tomorrow

Piet C. de Groen, M.D., Mayo Clinic College of Medicine

The amount of data generated by novel biomedical technologies is expanding at and ever increasing pace. Similarly, the amount of clinical data stored per patient-physician transaction is increasing at great speed. In the past, the researcher or physician read and processed the data as needed during research projects or medical decision-making processes. However, the increasing complexity of the medical field and the flood of additional data expected to be generated by genomic tests demand that data are preprocessed by computer algorithms before being presented to the researcher or physician. Thus medical research as well as its results for the medical practice will increasingly depend on a solid information technology infrastructure.

Elucidation of common, acquired diseases with multi-gene predisposition such as diabetes, coronary artery disease, autoimmune disease and cancer likely will require scanning of extremely large sets of clinical information, genomic targets and assessment of a large number of proteins for concentration, composition and structure. Increasingly, such large and expensive sets of medical information will be created by combining data from multiple institutions in order to create experiments with enough power to detect the multiple factors contributing to development of these diseases.

Thus information technology will play at least three critical roles in medical research. First, it must pre-process the data as data volumes have become too large for interrogation by the human brain. Second, it must allow data entry during medical practice in a format that allows reuse of those data for practice as well as research purposes; clinical research is becoming extremely expensive and measures to contain costs are needed. Third, information technology will need to combine data from different sources; effective combination is greatly facilitated by rigorous and universal adaptation of industry-accepted data standards. Mayo Clinic (focus: medical research) and IBM (focus: information technology) have combined their efforts in a collaboration aimed at providing those key three functions to Mayo Clinic research staff. Indeed, development of a standards-based, generalizable architecture that encompasses all above features, allows secure and easy exchange of data with other institutions, and has the performance and stability that is required for use in medical research as well as day-to-day patient care is the focus of the Mayo Clinic/IBM Computational Biology Collaboration.