Genopole ® : la médecine de demain s'invente aujourd'hui

Mercredi 4 Février 2004

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Science, technology and medicine: a two way road

Medical progress is based on advances in science, and, conversely, keen clinical observations can lead to discoveries of fundamental scientific importance. The productive interactions of science, technology, and medicine are illustrated by the growth in knowledge of the pathogenesis and treatment of Atherosclerosis, Sickle Cell Anemia, and Chronic Myelogenous Leukemia.

Medicine is now being transformed by revolutionary progress in genetics and molecular and cellular biology. The sequencing of the human genome provides a potential mine of treasure for diagnosis and eventual treatment of human disease. In seeking to derive maximal knowledge and utility from this mine, Information Technology plays an important role.

Pharmacogenomics combines pharmacology with genetics. It offers the promise of linking genetic variation to specific diseases and using gene expression data to define safe or toxic responses to drugs. Ultimately, the prescription of drugs may be individualized to each patient's genetic profile. In proceeding from gene sequences to pharmaceuticals, one may discover novel disease-associated genes that code for proteins that can serve as targets for pharmaceutical agents.

To advance knowledge of the genome and of the proteins coded by the genes, there is increasing need for collaboration of medical scientists with biologists, chemists, physicists, computer scientists, statisticians, mathematicians, and engineers. The desirability of such multi-disciplinary collaboration is reflected in the development of educational and research programs and structures at major universities and institutes. Systems Biology seeks to integrate the diverse kinds of information derived from the various disciplines in the construction of model systems for studying the interactions of components of the systems. It should be possible to test the validity of the models experimentally and to determine their predictive values.

Gene therapy should eventually become a major modality in human medicine. As viral and non-viral vectors are perfected, it should be possible to achieve integration and expression of the therapeutic gene at a desired site in the host cell genome free of the hazard of insertion mutagenesis and oncogene expression.

RNA interference represents a very promising approach to the silencing or inhibition of specific mRNAs whose translation one wishes to avoid. This technology has very broad applicability and will become a standard procedure in molecular genetics.

As the pace of scientific discovery increases in academic institutions, there is growing interest on the part of industry in establishing its research laboratories in close proximity to the universities, medical schools or teaching hospitals. The academic-industrial interface poses opportunities and challenges as does the role of venture capital in financing biotech start-ups. Fair and judicious management of these relations can result in gratifying and productive contributions to the health sciences and medical care.