Genomics Services Section Front Page

Virtually every human ailment has some basis in our genes. Until recently, doctors were able to take the study of genes, or genetics, into consideration only in cases of birth defects and a limited set of other diseases. These were conditions, such as sickle cell anemia, which have very simple, predictable inheritance patterns because each is caused by a change in a single gene. With the vast trove of data about human DNA generated by the Human Genome Project and other genomic research, scientists and clinicians have more powerful tools to study the role that multiple genetic factors acting together and with the environment play in much more complex diseases. These diseases, such as cancer, diabetes, and cardiovascular disease constitute the majority of health problems in the United States. Genome-based research is already enabling medical researchers to develop improved diagnostics, more effective therapeutic strategies, evidence-based approaches for demonstrating clinical efficacy, and better decision-making tools for patients and providers. Ultimately, it appears inevitable that treatments will be tailored to a patient's particular genomic makeup. Thus, the role of genetics in health care is starting to change profoundly and the first examples of the era of genomic medicine are upon us. It is important to realize, however, that it often takes considerable time, effort, and funding to move discoveries from the scientific laboratory into the medical clinic. Most new drugs based on genome-based research are estimated to be at least 10 to 15 years away, though recent genome-driven efforts in lipid-lowering therapy have considerably shortened that interval. According to biotechnology experts, it usually takes more than a decade for a company to conduct the kinds of clinical studies needed to receive approval from the Food and Drug Administration. Screening and diagnostic tests, however, are here. Rapid progress is also being made in the emerging field of pharmacogenomics, which involves using information about a patient's genetic make-up to better tailor drug therapy to their individual needs. Clearly, genetics remains just one of several factors that contribute to people's risk of developing most common diseases. Diet, lifestyle, and environmental exposures also come into play for many conditions, including many types of cancer. Still, a deeper understanding of genetics will shed light on more than just hereditary risks by revealing the basic components of cells and, ultimately, explaining how all the various elements work together to affect the human body in both health and disease.