

Mechanism Approach: Drugs Seeking Diseases

This approach is still currently popular. One or more compounds possessing a mechanism of activity are evaluated for activity in a specific disease. Or several: The challenge is the plausibility of suitable therapeutic activity and the degree of validity of one by hypothesis for a disease process.

Medicinal Chemistry Approach

This is also a traditional approach starting with molecular structures of known properties and seeking to modify structure to improve and optimize desirable features. The medicinal chemist utilizes knowledge of what past structural modifications have meant in terms of functional differences.

Technique-Based Approaches

Since the early 1990s, the most popular approaches have utilized new technologies based on expanded knowledge of how to characterize genetic and molecular level processes in humans and other species. Regrettably, as of late 2004, these methods have not yet borne the expected fruit. But perhaps the necessary period of learning how to use such tools is almost over.

Genomics The field of genomics, particularly high-throughput sequencing and characterization of expressed human genes, has created new opportunities for drug discovery. Knowledge of all the human genes and their functions may allow effective preventive measures and change drug research strategy and drug discovery development processes. Pharmacogenomics (dating back to the 1970s) is the application of genomic technologies such as gene sequencing, statistical genetics, and gene expression analysis to drugs in clinical development and on the market. It applies the large-scale systematic approaches of genomics to speed the discovery of drug response markers, whether they act at the level of the drug target, drug metabolism, or disease pathways. The potential implication of genomics and pharmacogenomics in drug discovery and development is that treatments for diseases could be identified according to genetic and specific individual markers, selecting medications and dosages that are optimized for individual patients.

Combinatorial Chemistry By reacting a set of starting chemicals in every possible combination, combinatorial chemistry gives life scientists the ability to create molecules in huge numbers and to test them for sought-after properties. Those abilities have attracted the attention of pharmaceutical companies. In recent years, virtually every large drug company has set up a combinatorial chemistry group.

The groups have revolutionized drug search programs. Before the mid-1990s, a single chemist could make perhaps 5 compounds per week. Now, he