Biological Microchips

ELE282 Biomedical Engineering Seminar, March 5, 2001

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Biological Microchips also know as biochips, are new technologies that have numerous capabilities. They are currently being used in DNA sequencing and researchers are beginning to use them to find functional activity of certain proteins, biochemicals and pathogens that can be expressed in genetic information. Biochips are being designed to replace more cumbersome and expensive laboratory equipment.

Areas for biochip use are in drug testing, medical treatments, and medical diagnostics. The chips are being used to identify specific genes and to test genetic impact of drugs and treatments such as the effects of chemotherapy. Mutated genes that could possibly lead to cancer, multiple sclerosis or Alzheimer's can also be detected. Pharmaceutical laboratories can use biochips to design better drugs for treatments and to test folk remedies to see if they really do contain helpful biochemicals. In addition, to benefiting the human body, the chips are used to detect crop diseases and provide more accurate tests for crime analysis.

Compared to computer chips, which execute logical operation, biochips perform biological reactions. They are constructed on glass slides or silicon-bases and carry out specific functions.

The benefits of the biochip are that it is faster due to the fact that biochips speed up reactions so results are available in minutes compared to days. They are smaller being compared to grains of pepper on a lab slide and inexpensive. A possible downside is that some believe the government is going to use this technology to inject biochips into Americans essentially "tagging" everyone.

There are two basic types of chips. The generic chip is designed independent of the nature of the sample to be analyzed, is multi-purpose, and contains all possible oligonucleotides (short strands of DNA). The customized chip is designed for a specific purpose and contains selected oligonuleotides and proteins.

Scientists at Purdue University created one of the first biochips by embedding the protein avidin onto a silicon computer chip. It is known that proteins are very specific about what they will interact with. If there is a protein that binds to the cell wall of a particular bacterium, the protein would be embedded into a biochip and if the bacterium were present, it would bind to the protein and change the electrical signal through the chip.

The Rensselaer Polytechnic Institute has created an active system of enzyme on a microchip. They dissolved the enzyme alpha-chymotrypsin in a solution and then coated a silicon wafer with the solution. It was found that the enzyme continued to function after being attached to the wafer and the institute is now using the technology to investigate glycolysis.