Demmer Technical Editing Sample (2004)

Original

Monoclonal Antibodies

Nobel prizes in science and medicine are given for what is called basic research - - research, which explains a fundamental concept or action of nature. Basic research is the type of research on which others may then build applications, which will benefit people. Drs. George Kohler and Cesar Milstein received the Nobel Prize for their basic research in developing a method of producing monoclonal antibodies. Monoclonal antibodies hold promise of becoming the “magic bullets” for which everyone in medicine has been hoping.

Antibodies are the basic structure of the bodies defense system against disease. They have been described as “lobsters” since they have claw-like projections. These molecular claws feel their way through the body until they find a shape which fits and then they cling to it. Another projection, or tail, then sends signals to the rest of the immune system to come and destroy the cell to which the antibodies are attached. The claw-like projections on antibodies can recognize and attach to antigens (foreign proteins) and also invaders such as viruses, bacteria, pollen, or even a transplanted organ such as a kidney. The tail waves and calls on PacMan-like cells, such as the monocytes of the blood, to come and destroy the invader.

Drs. Kohler and Milstein developed a way to clone molecular claws that will recognize only one shape. These are the monoclonal antibodies. This study has revolutionized diagnosis and disease treatment. Diagnostic kits already available to consumers rely on monoclonal antibodies to perform such tasks as identifying blood in the stool, testing for pregnancy, and determining the exact time when ovulation occurs. Monoclonal antibodies are helping doctors to diagnose the extent of a heart attack.

Studying monoclonal antibodies, the structure and growth patterns of the AIDS virus began to be understood by researchers.

Antibodies can be made, which will cause the body to use its own very powerful defense system to destroy disease producing cells, such as cancer, and invaders such as bacteria. In cancer treatment, monoclonals can be used both to kills cancer cells and to carry treatment to individual cells. The Food and Drug Administration (FDA) has just approved the use of one of these “magic bullets” to control the rejection crises of kidney transplant patients.

Diseases such as lupus and rheumatoid arthritis, are caused by the defense system of the body turning against itself. Researchers are very excited about the possibility of identifying the cells that provoke this response, and then developing monoclonal antibodies that would destroy the provoking cells. This is basically how the new OKT3 is being used to prevent rejection after organ transplants. Other research projects are trying to find the cause of Crohns disease, a severe form of ulcerative ileitis and colitis.

Antibody therapy may also be useful in treating serious bacteremia or “blood poisoning.” Even with antibiotic therapy the death rate due to serious bacteremia is about 40 percent. When patients develop toxic shock from the bacterial infection the mortality rate is 70 percent. Bacteria causes these severe problems because they may be resistant to antibiotics, the bacterial cells may release toxins into the blood stream, or the antibiotics can not penetrate the bacterial cell wall. The solution may lay in combining antibiotic and antibody therapy.

Although the results are promising, all the news is not good. Because monoclonal antibodies are now produced in mice they carry mouse material with them, this may

cause reactions. Some people do suffer from side affects of the therapy. Cancer cells tend to mutate and when they do the antibodies do not recognize all the cells as being cancerous. Thus, the cure rate is not 100 percent. Research into new fields of inquiry always moves slowly. The use of monoclonal antibodies in medicine is just beginning; it has not yet solved all the problems, but it does hold significant hope.

Annotated

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