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Khaw and Haber now use technetium-99m to give a signal detectable by standard scanners. Their initial experiments were done on dogs, but recent clinical studies show that detection and visualization of human heart attack damage is feasible.

Cancer is the target of most of the imaging projects. Hybritech is working on monoclonal antibodies specific for each of three types of solid tumor — breast, lung and liver. "The use of a radioactive label to identify a tumor will help the surgeon to define where the tumor is and the extent of surgery necessary," says Owen. "It will also confirm that the tumor is not anywhere else—that is, whether it is localized or metastasized."

In addition to the work Centocor is supporting on heart imaging, the Pennsylvania company also is attempting to image colorectal cancer using two monoclonal antibodies. "Those studies have been very, very promising up to this point," says Stewart Rosenberg of Centocor. "Tumor imaging has been demonstrated in terms of feasibility." He says that Centocor is currently looking at monoclonal antibodies that bind to other gastrointestinal, breast and ovarian tumors.

"We now stand at the threshold of a new era of highly selective antibody imaging," say Khaw and Haber. "Antibodies to 'tumor-specific' or 'tumor-associated' antigens can now be produced in large quantities by monoclonal antibody tech-

nology. As labeling methods undergo still further improvement, new radionuclides become available, and more tumor- or organ-specific antibodies are generated, these methods will play increasingly important roles in diagnosis and therapy."

It may be a short step from imaging with monoclonal antibodies to using them in therapy. If an antibody will seek out a tumor and bind to it, that same antibody may reduce the tumor size. However, if antibodies alone will not correct a medical condition, scientists predict that chemicals attached to the antibodies will make them better able to attack microorganisms or malignancies.

Experiments are already under way testing monoclonal antibodies as therapy in a variety of cancers. One problem anticipated with using monoclonal antibodies produced in rodents is that a patient's immune system will reject them as foreign substances. To get around this problem, techniques are being developed to produce monoclonal antibodies starting with human blood cells. Genetic Systems has filed a patent application for one such technology; Damon Corp. of Needham Heights, Mass., recently announced another (SN: 4/2/83, p. 215).

Scientists at Genetic Systems have produced human monoclonal antibodies against three bacterial infections that are serious problems for patients with depressed immune system function, such as burn victims and cancer patients under-

going chemotherapy. The company is beginning animal studies to determine the therapeutic effectiveness of these human antibodies against the bacteria *Pseudomonas*, *Escherichia coli* and *Klebsiella*. These studies are considered to be the start of a long-term project "because the process of getting FDA approval for a therapeutic agent is such a lengthy one," says Krieger of Genetic Systems.

Another therapeutic use of monoclonal antibodies is in suppressing in a very specific way the immune response of a patient receiving an organ or tissue transplant. With antibodies to specific white blood cells the patient may be unable to reject the transplant, but still have the immune system functioning to fight infections. Monoclonal antibodies against T cells also have been used successfully in a bone marrow transplant to prevent graft-versus-host disease (SN: 10/16/82, p. 245).

Finally, there is promise that monoclonal antibodies will specifically counter human cancer. Clinical trials are underway for a variety of cancers including leukemias and colorectal carcinoma.

In a sense, it is ironic that this antibody production technique, which starts with a cancer cell, is supplying new diagnostic, imaging and therapeutic tools to fight malignancy diseases. The technique thus tames a cancer in the laboratory and employs its prolific growth to supply previously unobtainable amounts of the natural agents for fighting disease. □

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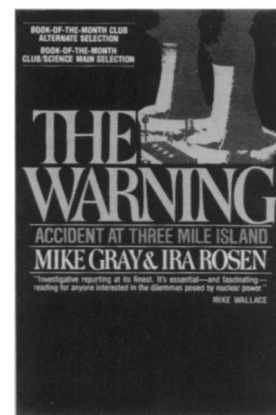
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