

An automated system for analyzing microorganisms in the human body heads an array of spinoff developments in the field of health and medicine

A New Tool for the Hospital Lab

The multi-module AutoMicrobic System (AMS), whose development stemmed from space-biomedical research, is an automatic, time-saving system for detecting and identifying disease-producing microorganisms in the human body.

Hospital costs being what they are these days, any innovation that offers reduced hospital stay-time is a very welcome advance in health care service. One such innovation, a space spinoff, is a time-saving system for analyzing a patient's body fluid sample; it automatically detects harmful microorganisms, identifies the type of microbe that is causing the infection, and in some cases suggests the most effective treatment.

Called the AutoMicrobic System (AMS), it is the product of years of research and development by McDonnell Douglas Corporation. The project originated in a NASA-sponsored study aimed at development of a fully-automated microbial detection and identification system for the space program. AMS is now commercially available through Vitek Systems, Inc., Hazelwood, Missouri, a McDonnell Douglas subsidiary.



The traditional manual method of testing for harmful microorganisms, or pathogens, requires these steps: First, specimens of body fluid—urine, for example—are prepared in cultures. These cultures are, in effect, "food" for specific types of microbes. The cultures are incubated for two to three days and studied for cell growth; from such study microbiologists can determine the presence of disease-producing organisms and identify the pathogens.

AMS does the same job quicker. Specimens are exposed to microbe nutrients for the nine most common pathogens. During a 4 to 13 hour incubating cycle, an electro-optical scanner studies each specimen once an hour. Changes in cell growth on each culture are monitored by computer. When growth reaches a pre-determined level, it indicates the presence of pathogens. The system automatically enumerates the pathogens and specifies the type. On push-button command, the information is displayed in video or reported on a printout.

AMS enables the microbiology laboratory to furnish guidelines for antimicrobial therapy the day after specimen collection; this amounts to a time saving of 50-80 percent over standard laboratory methods. The system also minimizes human error, reduces technician time and increases laboratory output, for AMS can handle up to 240 specimens at one time. Of greatest importance to the patient is shorter time in the hospital due to faster analysis of the infection and earlier treatment.

The basic AMS has recently been improved by development of an additional capability called "susceptibility testing." When the system's count of an identified pathogen shows a level potentially harmful to the patient, a growth sample is subjected to several different microbe-killing agents, such as penicillin or other antibiotics. AMS watches the reactions to determine which drug would be most effective in eliminating the pathogens. The Food and Drug Administration has approved susceptibility testing for one type of bacteria—a common form known as *E. coli*—and

expansion of this capability to other types is planned.

About a dozen of the Vitek systems are now in use at Veterans Administration and university hospitals and a number of additional installations are expected this year. Development work aimed at advancing the overall analysis capability of the system is continuing.

A tray containing the body fluid specimens of several patients, each with its own plastic identification card, is inserted into the AutoMicrobic System. The system automatically prepares cultures, incubates them, analyzes them and reports the presence and identity of pathogens, or harmful microorganisms.



In the photo at left, a laboratory technician is transferring a "positive" growth sample—one known to contain pathogens—from the patient's identity card at right to an injector tube for a further processing step. The AutoMicrobic System will subject the sample to several types of antibiotics and report which drug will most effectively eliminate the infection-causing microbes.