ASTRONAUTICS

Study Space Effects

Studies being carried on now are providing scientists with information essential to preparing man to survive a possible future trip through space.

➤ THE SPACE traveler probably will not be able to see his dentist twice a year. This means that any special dental problems arising on a trip to the planets will have to be solved here on earth.

Fortunately, however, the atomic-powered submarine and the International Geophysical Year have both given dentists the opportunity to solve some of the problems before putting a man into space, Capt. William R. Stanmeyer of the U.S. Navy reported.

Information from these two sources is being gathered and compared. Many of the conditions of space travel such as isolation and extreme cold are duplicated in submarines and at IGY research stations.

The over-all study is called the "eflect of stresses of an unnatural environment on oral health," Capt. Stanmeyer told scientists at the Association of Military Surgeons of the United States meeting in Washington.

So far several important discoveries have been made.

Acting on complaints of the crew of an A-powered submarine, scientists found that Freon had been escaping from the air conditioning system. Although the amount of Freon was below tolerance levels, the men had complained of burning lips and mouth linings.

It was discovered that at comparatively low temperatures (300 to 500 degrees Fahrenheit) Freon breaks down into hydrogen fluoride gas and hydrogen chloride gas. When these gases dissolved in the moist mouth, strong acids were formed that irritated the mucous membranes. Now, Capt. Stanmeyer reported, all joints in air conditioning systems are welded to prevent Freon escape.

Other studies indicate that possibly persons exposed to an atmosphere containing an increased carbon dioxide content should be "degassed" just as a diver is. This would mean gradual exposure to air richer in oxygen until the individual is again breathing normal room air.

There was an "alarming increase" in gingivitis, inflammation of the gums and mouth lining, and almost a 100% increase in cavities among submarine crews living mostly in a closed environment. The reason for this is not yet known, Capt. Stanmeyer said.

In addition to the need for maintaining oral health, the dentist has another important role, the scientist said. Examination of the teeth and soft tissues can tell much about a man's health form age six to the present, even indicating certain mental and emotional characteristics.

Even if the space traveler eats capsule meals where teeth are not needed, there will be the dental problem of preventing trouble through the "atrophy of disuse," Capt. Stanmeyer said.

➤ WHEN MAN goes shooting off into space, with the moon or other planets as his destination, he may find that he can survive best by lying down on the job.

Recent research has shown that man can stand greater and longer periods of accelerative force when he is "semi-supine," Dr. George Kitzes of the Wright Air Development Center told a space flight panel meeting.

Normally the human body is accustomed to the gravitation stress of one g at sea level. However, Dr. Kitzes said, peaks of 8 g to 9 g were tolerated for the first stage of a make-believe three-stage space missile; 5.6 g was tolerated for each of the other two stages. A majority of the test subjects could stand 3 g for as long as one hour, and 9 to 10 g for from 30 seconds to one minute.

Tests were conducted succesfully with the accelerative force applied to the subject from front to back, at right angles to the long axis of the body, Dr. Kitzes explained to the panel, which was part of the meeting of the Association of Military Surgeons of the United States.

INFORMATION STORE — A network of magnetic "pins" the size of a cigarette package, tested here by D. A. Meier, is said to be able to store 8,000 "bits" of information.

Noise and vibration are two other potential health hazards being studied at the Development Center's Aero Medical Laboratory, he said. It has been reported that the noise level of a rocket launching may be as high as 120 to 140 decibels. Sound at 100 decibels has been known to cause pain in man.

So far vertical accelerator studies at the Laboratory indicate there are no critical problems here. However, the scope of vibration during launching or re-entry still needs to be clearly defined, Dr. Kitzes said.

Considering only the physiological, psychological and protection requirements of manned space flight in his discussion, Dr. Kitzes summarized some of the results of recent research. Eventually, he explained, a closed system will be designed to provide complete regeneration and reclamation of all gaseous, liquid and solid materials needed and utilized in normal human metabolism.

The tremendous variability among persons in their ability to endure isolation and confinement will also be an important consideration in space flight. One individual was able to stay seven days in a completely dark, soundproof room without organized or planned activity. An equally willing volunteer gave up after 20 hours.

Concerning the problem of temperatures, Dr. Kitzes pointed out that test subjects have tolerated temperatures of 150 degrees Fahrenheit for five minutes or less. This may allow for the high temperature expected during re-entry of the space vehicle into the earth's atmosphere.

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ENGINEERING

Magnetic "Pin" Speeds Computers 10-20 Times

➤ A MAGNETIC device smaller than a common pin is expected to increase the "thinking" speed of future electronic computers 10 to 20 times.

Developed under the direction of D. A. Meier, research scientist of the National Cash Register Company's electronics division, the new magnetic glass rod serves as both a switching and information storage element.

The rod can switch electrical current at a speed of one 250-millionths of a second, faster than any known switching device, Robert G. Chollar, research vice president of the Company said.

It would also require much less power to operate than existing memory components. A network of 5,000 rods could operate simultaneously on the energy needed to light a 100-watt bulb.

In addition to boosting the "thinking" speed of data processors, Mr. Chollar said, the pin-sized device would increase the reliability of computers as well as reduce the amount of equipment needed to work on a problem. An electrical charge of only a 20-thousandths of a watt is needed to store one "bit" of information on the rod.

It should also enable space vehicles to navigate with a smaller power supply and increase their range.

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