publicity over possible health effects of exposure to excessive levels of X-radiation—such as genetic damage which wouldn't be discernible for 10 years or more—caused a wave of concern.

In the Congressional hearings that followed, J. Edward Day, Postmaster General in the Kennedy cabinet and now a representative of the Electronics Industries Association, said that the GE sets' emissions were "hundreds or more times" above the standard that the industry voluntarily goes by, but that standard (0.5 milliroentgens per hour at 5 centimeters) is 10 to 20 times below a dangerous level.

Radiation from TV sets is directly related to the voltage used. This made only color TV sets a problem since they operate at much higher voltages than black and white.

While color television has received the most radiation-scare publicity, it is actually a minor part of the overall problem. The big worry is medical and dental X-ray machines which produce about 90 percent of all man-made radiation. For this reason, HEW is expected to move quickly in the diagnostic X-ray area, now that it has the authority.

SURGERY

Other things at heart

History's first human heart transplant last December began an unprecedented ferment in the field of surgery. Never has there been such public excitement over the doings of surgeons.

Suddenly the doctors' professional ethics were a matter for street-corner discussion, and diagrams of surgical techniques appeared on front pages. It might seem logical in view of all this that the 54th annual clinical congress of the American College of Surgeons in Atlantic City, N.J., would have had a lot to talk about.

It did. Curiously enough, however, a surprisingly small amount of the talk was directly concerned with human heart transplants. A session at the close of the congress entitled "What's New in Surgery" was presided over by Dr. Owen H. Wangensteen, teacher of several of the pioneer heart transplant surgeons. But transplantation developments took their place alongside news in otorhinolaryngology and nine other fields, and they were discussed by kidney transplanter Dr. David M. Hume of the Medical College of Virginia.

One session of research papers was given over to cardiac and lung transplants. It was moderated by Dr. Norman Shumway of Stanford University Medical School, who with Dr. Richard Lower of MCV developed the surgical technique used in the first transplant. Even in this session there was more emphasis on lung transplantation research being carried out with dogs than on heart transplants, on which only three papers were presented.

The general impression to be gained, in fact, was that attending surgeons had other things on their minds.

One such thing concerns what most surgeons think is the wave of the future in the surgical correction of failing hearts—artificial hearts. Dr. John C. Norman of Harvard Medical School reports that nuclear fuel capsules capable of powering an artificial heart can be implanted in dogs without harm.

The nuclear fuel is plutonium 238—similar to the metal used in atom bombs. A capsule containing 33 grams of the fuel is attached to a titanium tube. The surgeon removes the dog's descending thoracic aorta, the main artery leading from the heart to the lower part of the body, and replaces it with the titanium tube. Heat from the capsule is conducted to the tube, warms the blood slightly, and is distributed to the body for dissipation by the skin.

In practice the capsule's heat would be used to drive a miniature steam engine which would provide power for a totally implantable pump. Such a pump is under development, though it may take seven more years to perfect.

Out of the heart field altogether, a University of Chicago group reports development of an artificial lung which may be of benefit in the treatment of hyaline membrane disease. Some 24,000 babies are born every year with this often fatal disease.

Previous artificial lungs, the kind usually found in heart-lung machines, are useful only for short periods, and then rarely in infants. Their pumping action damages the blood, leads to clots, and may leave tiny bubbles in the blood. If the pump is used enough to allow cure of the membrane disease the damaged blood injures the lungs.

The system reported by Dr. Robert L. Replogle avoids pump-caused damage by mimicking the action of the lungs. The blood flows across one side of a semi-permeable membrane. On the other side is oxygen. Carbon dioxide diffuses from the blood to the oxygen side; oxygen diffuses in the other direction. Blood pressure moves the blood across the membrane.

A team from Louisiana State University reports that tiny radioactive spheres injected into the abdominal cavity control the spread of cancers.

Dr. James B. Heneghan reports that the spheres, about 15 microns in diameter, are loaded with radioactive yttrium 90. In a series run with rabbits a dose of the spheres was injected along with cancer cells. After a month, 11 of 16 controls had cancer, compared with six out of 32 getting the yttrium.

LEM TO COME

Apollo 8 looks good for moon

"The moon for Christmas" has become a popular slogan around the Manned Spacecraft Center in Houston. Despite some 50 acknowledged mishaps, three nagging colds and an upside-down landing, space agency officials have declared the flight of Apollo 7 to be a "more than 100 percent success." The spacecraft landed safely in the Atlantic Ocean on Oct. 22 after making 163 revolutions around the earth in a little less than 11 days.

Barring future difficulties, it will take troubles which either have not yet been made public or turn out to be worse than presently believed to keep Apollo 8 from heading moonward in December.

If the moon is the word, Astronauts Frank Borman, James Lovell and William Anders will either simply swing around the moon and head home, or settle into a lunar orbit for as many as 10 revolutions.

The problem child, if there is one, will be Apollo 9, now planned as the first manned flight to include the much-troubled lunar module. Apollo 9 won't go to the moon, but it will give Gemini 4 veteran James McDivitt a chance to be the first pilot of what has been one of the most headache-producing pieces of equipment in the Apollo program.

On the actual lunar landing mission, the LM (known as "Lem" to almost everyone in the space program) will be the vehicle that ultimately carries two of the three astronauts in the crew down to the lunar surface, then brings them back up to rendezvous with their comrade waiting in orbit around the moon. On Apollo 9, however, it will simply get a stiff workout, including practice of the turns and docking maneuvers planned for the real thing.

Only one LM has ever been in space. That one was only a qualified success last January when its descent engine—the one that will lower it down to the moon—fired improperly. Mission controllers changed the flight plan on the spot, and made up the difference in ground tests later, but there have been other difficulties, including troubles with major engine components (unrelated to the descent engine misfiring). A particular woe is weight. The LM was to have weighed 32,000 pounds, including fuel, but is now so heavy that it may have to leave as much as 2,200 pounds of fuel behind for Apollo 9.

McDivitt, however, is confident. After a recent ground test he declared that it came through like no other spacecraft.

"My confidence level has gone up a lot," he said. "I just hope it flies as well as it performed in tests."