

One new use of the Anger Camera involves a technique for the diagnosis of lung diseases. In this innovation the patient receives an injection, or inhales, a small amount of radioactive xenon. As he breathes in front of the scintillation camera, it records the distribution and rate of the xenon entering and leaving his lungs and transmits this information to a computer. From the computer readout the physician can analyze the functioning of 64 regions of the lung. This technique holds great promise for early detection of emphysema and a certain type of lung cancer difficult to diagnose by X-ray, fluoroscope, or lung scanning.

Recently a new investigative technique has been developed for producing images of the thyroid gland and other organs through the use of X-ray fluorescence. This technique incorporates the basic scheme of an X-ray fluorescence spectrophotometer, and therefore no radioisotope is introduced into the patient. Americium-241 is used as a gamma radiation source, and its gamma rays penetrate to the thyroid gland, where they excite atoms of stable iodine present there, causing them to emit characteristic X rays. The information obtained from this device, developed at the Argonne Cancer Research Hospital, is unique. It describes the distribution and relative concentration of stable iodine within the thyroid gland and will serve as a valuable addition to conventional thyroid scans and studies.

Radioisotopic studies can also be carried on with probes inside living systems. The probe is used to measure the location of the radioisotope serving as a label for the part of the anatomy that is to be studied. This technique usually requires measurements that are restricted to a small volume and are best performed with miniaturized semiconductor detectors. Such detectors are now being used experimentally to measure regional blood flow in the brain.

Since a number of important neurological diseases are caused by sub-surface disturbances, more refined probe methods for quantitative measurements in the depths of the brain are being developed. In one such program miniaturized probes are implanted within the brain. Blood volume and flow rate are determined following the inhalation of either xenon-133 or krypton-85 by the patient. By the use of this technique, it has been possible to pinpoint areas suffering from reduced blood flow.

Going from the miniaturized probes to much larger equipment, I want to say a few words about the whole body counters that have been de-