concentration" suggested by Oldendorf is identical to the term "differential absorption ratio" except that it is expressed in percent.

We propose the following terms for expressing radionuclide concentrations in tissues: (A) relative concentration (RC):

$$\frac{\mu\text{Ci found per gm specimen}}{\mu\text{Ci administered per gm body weight}}$$

This term should be used when the whole-body burden at the time the specimen was obtained is unknown) and (B) relative retention (RR):

$$\frac{\mu\text{Ci found per gm specimen}}{\mu\text{Ci retained per gm body weight}}$$

This last term should be used whenever the whole-body burden is known at the time the specimen is obtained either by direct measurement or because excretion has been measured or is known to be negligible. The term RR has the advantage that a value of unity is physiologically meaningful, i.e., it corresponds to no preferential uptake or elimination of radionuclide from the specimen under examination. Some users may prefer, as Oldendorf does, to multiply the ratios by 100 so that results may be expressed as percentages. If this is done, the abbreviations would be % RC or % RR. Obviously all activities must be corrected to some common time.

We would like to present these suggestions in the interest of making the results of determinations of radionuclides in tissue more meaningful and of broader application.

HELEN Q. WOODARD
RODNEY E. BIGLER
BARRY FREED
GERALD RUSS
Memorial Sloan-Kettering Cancer Center
New York, New York

REFERENCES

1. OLDENDORF WH: Expression of tissue isotope distribution. *J Nucl Med* 15: 725–726, 1974

2. BLAU M: Radiation dosimetry of ^{131}I-19-iodocholesterol: The pitfalls of using tissue concentration data. *J Nucl Med* 16: 247–248, 1975

3. FAILLA G: Personal communication, 1941

4. KENNEY JM, MARINELLI LD, WOODARD HQ: Tracer studies with radioactive phosphorus in malignant neoplastic disease. *Radiology* 37: 683–690, 1941

5. WOODARD HQ, KENNEY JM: The relation of phosphatase activity in bone tumors to the deposition of radioactive phosphorus. *Am J Roentgenol Radium Ther Nucl Med* 47: 227–242, 1942

RADIOACTIVE TRACER STUDIES OF THE HEART AND CIRCULATION

Radioactive tracers, which were among the earliest noninvasive tools for obtaining quantitative physiologic information about the cardiovascular system, are of growing importance in the field of diagnostic cardiology. Currently they provide diagnostic data unavailable by other means, such as measurements of regional blood flow, as well as supplementary information of importance in hemodynamic and angiographic examinations involving cardiac catheterization. Procedures for estimating the size and location of acute myocardial infarcts, delineation of regional ischemia during exercise, and evaluation of regional and total right and left ventricular function are rapidly being developed. Special-purpose instrumentation specifically designed for patients with cardiovascular disorders will soon be available, including (A) lightweight portable imaging instruments capable of use at the bedside, in the operating room, and in intensive care and coronary care units; (B) emission and transmission tomographic systems capable of producing transverse sections of the heart to help locate regions of infarction or dyskinesis; and (C) single-purpose hard-wired systems for use in the cardiac clinic, such as a device for radiocardiography capable of computing cardiac output and ejection fractions. In addition, efficient computer codes are being developed that, in conjunction with radionuclide angiocardiography, provide a wide range of indices of ventricular function, including cardiac output, pulmonary vascular volume, stroke volume, ejection fraction, and shunt flow measurements. These modalities are the subject of a newly issued report by the Inter-Society Commission for Heart Disease Resources (ICHD) published in the current issue of *Circulation* (*1*) which is in effect an overview of the status of cardiovascular radionuclide diagnostic studies as well as a guideline to the hospital resources, both physical and human, that are required for an exemplary nuclear medicine service dealing with this area of study.

In a previous report (*2*), the ICHD outlined resource specifications for regional pulmonary perfusion and blood pool imaging and anticipated the development of regional myocardial perfusion and regional pulmonary ventilation. In the current guideline, published 4 years later, 11 categories of nuclear cardiovascular examinations are described: radiocardiography, radionuclide angiocardiography, ventricular wall motion and performance, evaluation of myocardial perfusion, acute myocardial infarct visualization, radionuclide arteriography and venography, regional pulmonary perfusion and ventilation, central nervous system (CNS) studies, renal studies, compartmental volumes, and drug and hormone assays. Some of these areas, such as CNS and renal studies, relate to standard techniques for determining the state of the peripheral circulation, but other procedures have only recently become clinically possible. Many applications, while extremely promising, still occupy an intermediate stage between early clinical testing and routine use. A few, such as acute myocardial infarct scanning, are embryonic; but considering the pace of trial and acceptance in this field, they too may soon be in widespread use. The particular examinations included in these guidelines are, in the judgment of the authors, those most likely to have an impact on patient care.

Resource guidelines for organizing a central hospital nuclear medical program are also reviewed, updated, and expanded. The space, equipment, and manpower requirements described will provide services for all kinds of diagnostic problems, not just those associateed with cardiovascular diseases. Training qualifications for the professional and technical staff, appropriate case loads and utilization levels, methods of quality control, and procedures for protecting the safety of both patients and staff from excessive exposure to ionizing radiations are proposed. In hospitals with heavy cardiac case loads, special satellite cardiovascular nuclear units are recommended when they are medically and economically practical; these can be located in the coronary and intensive care units, noninvasive cardiac laboratory, catheter–angiographic laboratory, emergency room, and cardiac operating room.

These resource guidelines are directed to physicians and hospital administrators who are currently responsible for planning and organizing nuclear medicine programs or who anticipate a future need for such services in their community. It is assumed that the selection and use of these procedures will be the joint responsibility of nuclear medicine specialists and cardiologists who accept their obligation to keep abreast of advances in this rapidly changing field, particularly with regard to instrumentation and methodology.

S. J. ADELSTEIN
Harvard Medical School
Boston, Massachusetts
C. JANSEN
Loma Linda University
Loma Linda, California
H. N. WAGNER, JR.
The Johns Hopkins Medical Institutions
Baltimore, Maryland

REFERENCES

1. ADELSTEIN SJ, JANSEN C, WAGNER HN: Optimal resource guidelines for radioactive tracer studies of the heart and circulation. Report of the Inter-Society Commission for Heart Disease Resources. *Circulation* 52: A9–A22, 1975

2. Report of the Inter-Society Commission for Heart Disease Resources. Cardiovascular disease-acute care. II. Optimal radiologic facilities for examination of the chest and the cardiovascular system. *Circulation* 43: A129–A156, 1971

BRAIN SCANNING IN METASTATIC DISEASE

In a recent issue of *The Journal of Nuclear Medicine*, Brooks, Mortara, and Preston reported that in six patients with adenocarcinoma of the colon and cerebral metastases, all had negative brain scans with ^{99m}Tc-pertechnetate (*1*). From this unexpected finding they concluded that a negative ^{99m}Tc-pertechnetate scan is the rule rather than the exception with cerebral metastases from adenocarcinoma of the colon. Because of these unexpected results we reviewed our experience with brain scans in patients with adenocarcinoma of the colon to determine if our data would support this conclusion.

Based on data obtained from the tumor registry and records of the nuclear medicine department from January 1967 until the present time, 18 cases were available for review. The results of these scans, positive and negative, were correlated with the patients' available medical records before and after scanning.

Of the 18 patients, 9 had positive brain scans; 5 of these were highly suggestive of metastatic lesions. In one of these five the primary lesion was presumed to be in the lung. The other four cases had histories, signs, and symptoms typical of cerebral metastasis from pathologically proven adenocarcinoma of the colon. Histologic proof was provided in two cases; in one case at surgery and in the other at autopsy. The other two were felt to have inoperative cerebral lesions on the basis of clinical information and scan. Histologic proof was never obtained on these last two.

In the group of patients with negative brain scans, the reasons for performing the scans were varied. Not all of these patients were scanned because of clinical evidence suggestive of a cerebral metastasis. None of this group had subsequent clinical histories strongly suggesting false-negative brain scans.