

SCIENTIFIC EXHIBITS

E-1 *Intra-Arterial Particulate Radioisotopes to Treat Advanced Cancer.* EDGAR D. GRAY AND THOMAS R. NOLAN (Ferst Research Center, Piedmont Hospital, Atlanta 9, Georgia)

Yttrium-oxide made radioactive as Y-90 particles, size 6 to 100 microns are pictured and demonstrated in reality. They are shown microscopically, as isolated particulate material. Photo micrographs containing trapped Y-90 particles in small blood vessels of tissues are demonstrated. Autoradiographs of organs containing many homogenously trapped radioactive particles without damage to normal tissue are presented. (Patients and Animals). Arteriograms (X-Ray reproductions) demonstrate canulae in vessels of cancer patients leading to pelvic organs, liver, lung segments, placed for injection of radioisotopes. Photographs of illustrative patients and a summary of 50 patients treated are presented.

This work has been supported by Piedmont Hospital, Georgia Institute of Technology, Abbott Laboratories and the Atomic Energy Commission.

E-2 *Abnormal Karyotype Findings in Human Resulting from X-Ray, I¹³¹ Therapy and Chemotherapeutic Agents.* CHARLES T. KNORPP, CARLOS E. NASJLETI, H. H. SPENCER, ROBERT RAPP (Veterans Administration Hospital, Ann Arbor, Michigan) and J. J. HINIKER (Assistant Chief Medical Director of Dentistry) (Central Office, Washington, D.C.)

This exhibit demonstrates the effect of radiation and/or chemicals on the genetic mechanism of human leukocytes. One of the greatest challenges to contemporary scientists is to find the mechanisms by which these biological effects are produced. As yet, only a general pattern can be seen which links the effects of radiation and chemicals with the biological changes in cells. We are also able to present two practical techniques that resulted from our experiences: 1. A simple and rapid method of preparation of chromosomes from human leukocyte cultures. 2. A practical method of utilizing individual cell microphotographs for reading and interpretation of chromosomal aberrations.

Exhibit Components: (5 panels)

1. Cell Division Cycle (Mitosis).
2. Technique for the Preparation of Chromosomes.
3. Normal and Abnormal Karyotypes.
4. Damage to Chromosomes from Radiation, I¹³¹ and Chemotherapy Agents.
5. Credits.

E-3 and E-4 *Scintiscanning of the Lung Using Aggregates of Iodinated Human Serum Albumin.* J. L. QUINN, III, J. E. WHITLEY, R. W. PRICHARD and A. S. HUDSPETH (Bowman Gray School of Medicine, Winston-Salem, North Carolina)

By changing the pH and temperature of iodinated human serum albumin, Taplin *et al.* developed a method of producing aggregates of various predictable sizes.

Introducing these aggregates of 50-100 micron sized particles into the venous system results in their being held up temporarily in the pulmonary arteriolar bed. A photoscan immediately after injection will outline the integrity of this bed. An obstruction to the arterial flow from any cause (neoplasm, embolus, nodal, etc.) will be evidenced similarly by decreased activity in the involved areas.

This method has outlined experimental infarcts in dogs.

The details of compound preparation and experimental infarct production are presented.

Our initial clinical experience and the possible future applications of this diagnostic procedure are illustrated.

E-5 and E-6 *In Vitro* Measurement of Thyroid Function Using Resin-Impregnated Polyurethane Sponge. DAVID J. CARLSON, DAVID J. LAFOND AND MARIE B. HEINEN AND SUZANNE CARROLL (Milwaukee Hospital, Milwaukee, Wisconsin)

The exhibit by photograph (color transparency) will outline procedure used in Resin-Sponge Tri-iodothyronine test (Triosorb)®. Three hundred forty (340) determinations were performed in duplicate. Statistical analysis will demonstrate distribution studies, normal ranges and values, and standard deviation. Comparable data is available for I¹³¹ uptake, RBC-T3 uptake and protein bound iodine in ½ or more cases. Comparative studies (scattergrams) will be shown comparing Resin-Spong T3 values with values of the other procedures. A short summary of history of thyroid testing procedures will be shown. Indications and advantages of this procedure will also be given.

E-7 and E-8 *Detection of Occult Bone Metastases by Photoscanning with Radiostrontium.* DAVID M. SKLAROFF, N. DAVID CHARKES, AND J. GERSHON-COHEN, (Albert Einstein Medical Center, Philadelphia, Pennsylvania)

Conventional roentgenography frequently fails to detect metastatic carcinoma to bone. The authors have successfully investigated the use of Sr⁸⁵ in 118 cancer patients with known or suspected metastases to bone and Sr^{87m} in 17 patients and have shown that the radiostrontium photoscan of detecting osseous metastases prior to visible roentgenographic changes. Histopathologic confirmation of tumor localization in scan-positive areas was obtained by bone biopsy in 17 patients. Resolution was evaluated by scan of calf-leg phantom and by comparison with known areas of osteogenesis (callus) and was found to be good.

E-9 and E-10 *Radioisotope Pulmonary Function—Studies with Xenon-133.* GERALD L. DENARDO, MAJOR, M.C., DONALD J. BOWES, CAPTAIN, M.S.C., JEROME S. BRODY, CAPTAIN, M.C. AND JON B. GLAZIER, CAPTAIN, M.C. (Fitzsimmons General Hospital, Denver, Colorado)

The exhibit illustrates a radioisotope scanning system, magnetic tape recorder and read-out system specially designed for pulmonary function studies using Xenon-133. The system permits data manipulation in a semi-automated fashion, and detection of radioactivity over an infinite number of points. This permits measurement of ventilation, perfusion, wash-in and wash-out on a regional basis. Measurement of the relationship of ventilation-perfusion on a regional basis is not possible with non-radioisotope techniques. The display also illustrates normal and abnormal results obtained with this technique.

E-11 and E-12 *Progress in the Clinical Use of the Scintillation Camera.* HAL O. ANGER, ALEXANDER GOTTSCHALK AND DONALD C. VAN DYKE (Donner Laboratory of Medical Physics and Biophysics, University of California, Berkeley, California)

The scintillation camera with an 11½ inch sodium iodide crystal has been in use for nearly two years and is now a clinically proven instrument. Localization of brain lesions using Ca⁴⁵-EDTA in a large series of patients has been accomplished with a marked reduction of examination time and patient dose. The study of renal structure with Hg²⁰³-Neohydrin and renal

dynamics with serial pictures or time-lapse movies using I^{131} Hippuran will be illustrated. Liver pictures are taken in five minutes with I^{131} Rose Bengal. Positron bone pictures in both neoplastic and non-neoplastic disease are being taken with F^{18} . Finally, the distribution of erythropoietic bone marrow in various pathologic states using positron-emitting Fe^{52} will be shown.

E-13 *Radioisotopes in the Diagnosis of Renal Hypertension.* G. V. TAPLIN, E. K. DORE, A. T. COCKETT AND D. E. JOHNSON (Laboratory of Nuclear Medicine and Radiation Biology; UCLA Medical School, Los Angeles and Dept. of Radiology, Los Angeles County Harbor General Hospital, Torrance, California.

The diagnostic value of the radiorenogram and renal scanning in the diagnosis of renal vascular hypertension is illustrated by correlation of the results of the radioisotope procedures with findings from rapid sequence I.V. pyelography and with renal arteriography. Renal artery constriction studies in rabbits and dogs are presented to support the reliability of the radiorenogram as an indicator of unilateral renal ischemia. The renogram results in 150 consecutive hypertensive patients are analyzed to demonstrate the relative diagnostic significance of major vs minor difference in fractional renal blood flow.

E-14 *Radioalbumin Macro-Aggregates for Human Lung Scanning.* G. V. TAPLIN, M. L. GRISWOLD, D. E. JOHNSON, E. K. DORE, H. S. KAPLAN AND M. M. AKCAY (Laboratory of Nuclear Medicine and Radiation Biology UCLA School of Medicine, Los Angeles; and Dept. of Radiology, Los Angeles County Harbor General Hospital, Torrance, California)

Macro-aggregates (5-25- μ) of radioalbumin are trapped in the pulmonary capillaries following I.V. injection for a time sufficient to scan the lungs. The dose of carrier albumin need not exceed 0.1 mg/kg and the calculated radiation exposure to the lungs from 100-200 μ c of I^{131} labeled material is 75-150 mrad and about 20 times less for I^{125} . No reactions to the test material were encountered in the 150 patients studies.

The diagnostic value of lung scans is illustrated in selected patients by comparison with their chest x-rays and in some instances with pulmonary angiograms. The scan is useful for the early detection of pulmonary emboli and in the localization of lung cysts and abscesses. It is also helpful in the evaluation of alterations in regional pulmonary blood flow in pneumonia, pulmonary infarction, lung cancer, pulmonary tuberculosis and emphysema.

E-15 *Digital Computer Analysis of Radioisotope Scans.* DONALD W. BROWN, (Section of Nuclear Medicine, Depts. of Radiology and Medicine, University of Colorado Medical Center, Denver, Colorado)

An objective approach to the analysis of radioisotope scans using a digital computer is presented. Pulses from the pulse height analyzer of the scanner are summated at one second intervals and fed into a digital computer. By this means variation in activity from adjacent areas can be evaluated statistically and objectively. The computer's printer can then be used to print out scans graphically. This allows one to vary the background erase and contrast enhancement. Several examples of scans performed in this manner will be displayed along with the computer program and photographs of the equipment used.

E-16 *Color Scanning.* ROBERT T. MORRISON and TITUS C. EVANS (Radiation Research Laboratory, State University of Iowa, Iowa City, Iowa)

More than 60 color scans of the thyroid, liver, kidneys and brain have been made with a recently developed commercially available color-coded digital printout attachment. Iodine-131, Mercury-203, and Gold-198 were used. Color scans of various organs and a short pertinent history of the patient and biopsy or autopsy finds are included. Black on white dot scans and photoscans made simultaneously with the color scan are present for comparison.

E-17 *ORINS Symposia in Medicine.* RALPH M. KNISELEY and GOULD A. ANDREWS (Oak Ridge Institute of Nuclear Studies, Oak Ridge, Tennessee)

The Medical Division of the Oak Ridge Institute of Nuclear Studies supported by the Division of Biology and Medicine of the USAEC, periodically presents symposia on selected topics of interest to physicians and investigators using radiation and radioisotopes in biological applications. Invited experts in nuclear medicine from the United States and from other countries present new material and critical evaluations of older information. The symposia are published by the Division of Technical Information of AEC. The exhibit presents information on the available published symposia "Progress in Medical Radioisotopes Scanning" and "Dynamic Clinical Studies with Radioisotopes."

E-18 *The Isotope Encephalogram.* JACK K. GOODRICH, and FORREST T. TUTOR (Jackson, Mississippi)

A review of 400 consecutive brain scans revealed approximately 40 diagnosed brain tumors. The exhibit reports the correlation of brain scan findings with a diagnostic battery consisting of the Isotope Encephalogram, Neurological Physical, Skull Films, Carotid Arteriogram, Pneumoencephalogram and Ventriculogram. The brain scan maintained a high degree of accuracy and was felt to have proved itself as an excellent first step procedure in screening neurological patients. To this end its advantages are multiple for there is no reported patients morbidity, no post-procedural sequelae, and it lends itself well to outpatient examination.

E-19 *Collimator Evaluation with the I.A.E.A. Scanning Phantom.* MERRILL A. BENDER and MONTE BLAU (Roswell Park Memorial Institute, Buffalo, New York)

The exhibit presents an evaluation of four commonly used 3 inch focusing collimators with the I. A. E. A. large organ scanning phantom. Each collimator was tested with seven radionuclides having gamma ray energies ranging from .027 MeV to 1.3 MeV. Each collimator, radionuclide combination was evaluated with four different "tumor" sizes each at four different depths. The results can serve as a guide for the selection of a suitable collimator for a given clinical situation.

E-20 *Biomedical Research with High-Energy Heavy-Charged Particles.* JOHN LAWRENCE (University of California, Berkeley, California)

E-21 *Staff Education in Nuclear Medicine.* D. L. TABERN and ANNE DOLBOW (Weiss Memorial Hospital, Lake Bluff, Illinois)

E-22 *A New Organ Scan Display In Polaroid Color.* H. L. JAFFE and RALPH ADAMS (Cedars of Lebanon Hospital, Los Angeles, California) *See Abstract T-5.*