

**ANNUAL RESEARCH REPORT
1 JULY 1973 - 30 JUNE 1974**

**ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE
DEFENSE NUCLEAR AGENCY
BETHESDA, MARYLAND 20014**

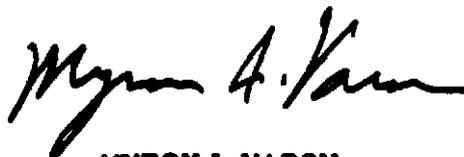
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This report describes, in brief summary, the scientific accomplishments of the Armed Forces Radiobiology Research Institute (AFRRI) for the period 1 July 1973 to 30 June 1974.

During this period, the broadened research program of the AFRRI led to significant contributions in biomedical research. The Behavioral Sciences Department continued to provide biological data relevant to nuclear combat operations, particularly the employment of nuclear weapons in tactical or theater nuclear warfare. A significant result of the scientific effort within the Experimental Pathology Department was the award of a contract by the National Heart and Lung Institute to AFRRI to conduct research on "Improved Preservation of Granulocytes for Transfusion."

In this report, the majority of the technical summaries of the Neurobiology Department have appeared in the open literature and have led to numerous collaborative efforts with distinguished scientists including two Nobel laureates. The nuclear medicine and biochemistry efforts of the Radiation Biology Department led to numerous clinical applications of this Department's research. The 1st Invitational Symposium on the Serodiagnosis of Cancer, jointly sponsored by the AFRRI, the Laboratory Service of the National Naval Medical Center, and the American Society of Clinical Pathologists was a highlight of fiscal year 1974.

The Institute's accomplishments would not have been possible without the continued support of numerous agencies. Appreciation is extended to the Surgeons General who have continued to provide the highly trained and qualified scientific personnel required by such a diversified research program. Financial support was provided by the Navy Toxicology Unit, the Office of Naval Research, the U. S. Army Medical Research and Development Command, the Food and Drug Administration and the National Institutes of Health.



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...ed for more than 30 days. At this time the animals were normal in appearance. Thus, the combination of the two treatments, decontaminated hosts and cells from endotoxin tolerant donors, was effective in promoting survival from acute GVHD. Neither treatment alone could achieve the effectiveness of the two used together.



PROTEIN-BOUND CARBOHYDRATES AS BIOCHEMICAL CRITERIA IN DIAGNOSIS AND PROGNOSIS OF MALIGNANT NEOPLASIA

Principal Investigator: *A. S. Evans*

Collaborators: *M. F. Dolan, W. J. Fouty, National Naval Medical Center;
J. D. Lamberg, T. C. Pomeroy, National Institutes of Health;
and W. E. Jackson III, AFRR I*

Technical Assistance: *M. J. Ryan, G. E. Routzahn and P. W. Jones III*

The present study is a continuation of the investigation of the utility of the glycoprotein profile system as an objective diagnostic and prognostic tool to aid the physician in in-hospital management and outpatient follow-up of patients with, or suspected of having, malignant neoplasia.

During this period, 994 serum specimens were examined. One hundred fifty-six of these samples were from patients in (or outpatients of) the National Naval Medical Center, Bethesda, Maryland, and 765 from the cancer therapy group, National Institutes of Health (NIH) Clinical Center, Bethesda, Maryland. In addition to the above human patients, sera from 73 rats were received from P. Z. Sobocinski of the AFRR I. Combined with previous periods, a total of 2,114 samples have been received for processing.

The test battery consisted of total protein, total serum globulins, protein-bound neutral hexoses, hexosamines, sialic acid, and fucose. From these analytical data, a number of additional parameters were derived: ratios of the various carbohydrates to the total protein (mg CHO/dg protein), carbohydrate to globulin ratios (mg CHO/dg globulin), and mole-fraction ratios of the various carbohydrates. The glycoprotein profile consisted of the graphical representation of these analytical and derived data.

The glycoprotein profile system continues to exhibit excellent correlation with clinical data for presurgical estimation of malignant tumor extension or activity^{2,3} and postsurgical evaluation of therapeutic efficacy.¹

Preliminary computerization of the data by discriminant analyses of a 27 x 27 matrix indicates that the site of the tumor process exercises a large influence on the glycoprotein response of the patient. Thus, when only first samples on each patient were considered -- without regard for the individual's clinical status, response to therapy, or the cell-type of the tumor -- 91.7 percent of buccal cavity and pharyngeal tumors, 83.9 percent of breast tumors, 82.1 percent of tumors of the digestive organs and peritoneum, and 63.0 percent of tumors of the respiratory system were correctly selected by the computer as to tumor locale. In the respiratory tumors, which showed the poorest selectivity, 8 of 10 of the "misclassifications" gave the correct site of the primary lesion as a strong second choice with the first choice being sites of metastases.

REFERENCES

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3. Evans, A. S., Dolan, M. F., Sobocinski, P. Z. and Quinn, F. A. Utility of serum protein-bound neutral hexoses and L-fucose for estimation of malignant tumor extension and evaluation of efficacy of therapy. Bethesda, Maryland, Armed Forces Radiobiology Research Institute Scientific Report SR73-20, 1973. *Cancer Res.* 34:538-542, 1974.



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