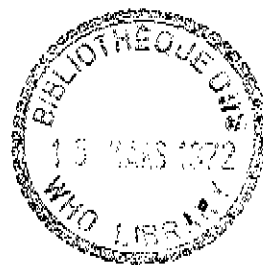


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THE WHO BIOMEDICAL RESEARCH INFORMATION SERVICE
(WHOBIRIS)



Prepared by: The Data Processing Unit
World Health Organization, Geneva

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CONTENTS

	<u>Page</u>
1. INTRODUCTION	3
2. DATA COLLECTION	4
3. ANALYSIS AND CODING OF DATA	5
4. FILE ORGANIZATION FOR COMPUTER PROCESSING	6
5. COMPUTER PROGRAMMES AND FLOW OF WORK	7
6. FURTHER DEVELOPMENTS	10

ANNEXES

- ANNEX 1 FORM B
- ANNEX 2 FORM C
- ANNEX 3 FORM D
- ANNEX 4 RETRIEVAL PRINTOUT

1. INTRODUCTION

The WHO Biomedical Research Information Service (WHOBIRIS) is a computer based information retrieval service which was established in 1964 with the following objectives in mind:

to have comprehensive and up-to-date information available about medical research in progress throughout the world;

to provide this information on request to research organizations, institutions, scientists, research administrators and other interested persons;

to facilitate the study of research trends in fields of special interest;

to facilitate contact between scientists working on the same or related subjects;

to act as a clearing house for information on current biomedical research.

The service does not propose to collect or provide information on published articles or on the results of research.

In order to develop an adequate methodology and in view of the enormous amount of data that would finally be involved it was decided to undertake, initially, a pilot study, concentrating on the collection and analysis of:

information about cancer research on a world-wide scale.

By means of questionnaire forms, the Office of Research Planning and Co-ordination has collected a mass of technical information relating to medical research institutions, departments, scientists and current research projects. When this information has been analysed, classified and coded, it is converted to punched cards which, in turn are used as a medium for storing the information in a computer using both random access disk files and magnetic tapes. From these records it is possible to retrieve a variety of technical information both on a regular basis and in response to ad hoc inquiries. Extensive global coverage on current research in cancer has already been achieved.

The service became operational in July 1966.

2. DATA COLLECTION

It was realized that accurate and up-to-date information about biomedical research could only be supplied by scientists themselves. It was, therefore, decided that only information provided by investigators, directors of institutions, or heads of departments should be included in the system. The first step is to identify the research institutions concerned. The Office of Research Planning and Co-ordination therefore prepares a list of research institutions known to WHO in a particular country. This list is sent to the national authorities such as Ministry of Health, Medical Council or Academy of Science for correction and approval. When this list is returned, information is collected through a series of questionnaires, as follows:

- 2.1 Questionnaires (see Form B, Annex 1) are sent to the directors of all medical research institutions identified, asking for information about their structure, functions, funds, departments, etc.
- 2.2 When these questionnaires have been returned to WHO, a further questionnaire (see Form C, Annex 2) is sent to the director of every research department asking for information about their current research and, in particular, for the titles of all projects and the names of the scientists working on them.
- 2.3 A third questionnaire (see Form D, Annex 3) is then sent to all scientists asking for biographical data, e.g. date of birth, nationality, field of specialization, etc.
- 2.4 It will be seen from the above system that no one person is asked to complete more than one questionnaire, with the possible exception of the director of an institute or unit chief, and then only if he or she is engaged at the same time in a research project. These people would have to complete questionnaire B or C and questionnaire D. Not all questionnaires are returned. The percentage of answers varies from country to country. It is considered a good result when 50 per cent. are received back after three months. Reminders are sent out to those who did not answer.

Thus, in the cancer study information was received from 459 institutions in 58 countries, comprising 1066 departments and involving 3860 scientists. Altogether 5036 project titles were reported.

3. ANALYSIS AND CODING OF DATA

3.1 Although the names of institutions, departments and scientists, as well as the titles of projects, are stored and can be printed by the computer in full open text and in the original language, a coding system was devised to organize the data economically in logical form and to facilitate cross references between various information files. Thus, numbers were given to institutions, departments, scientists and projects. A three-digit country code which had already been introduced in WHO for some time, was used and extended according to the following system:

CCC	Country number
CCC I III	Institution number
CCC I III DDD	Department number
CCC I III DDD PP	Project number
CCC I III SSS	Scientist number

where I III is a serial number of the institution within a country, DDD a serial number of the department within an institution, etc.

3.2 While the above coding system solved some administration problems in data handling, there remained the major problem of analysing, classifying and coding the data in a form which would provide a flexible and efficient retrieval medium. Thus, it was decided to analyse the research project titles under four main headings, as follows:

Field of activity
Disease orientation
Test object
Technique used

The intention was to provide a facility for retrieval, not only under any single one of these headings (at various levels), but also under several combinations thereof. Therefore, the coding lists were built on the decimal system.

3.3 A fifth possibility of classifying a project is by descriptors. These are words which characterize a project very well, but do not fit under any of the main headings. They may, but need not, appear in the project title. A purely identifying four-digit number is attached to every one of them.

The combination of several descriptors or of descriptors with any one of the main headings provides the possibility of retrieving very specific information.

4. FILE ORGANIZATION FOR COMPUTER PROCESSING

The data must be organized in such a way that they can be efficiently processed by the computer. Magnetic tapes and discs are means of storing large amounts of data. For example, on a tape reel 15 to 20 million characters can be stored. They can be read with a speed of 30 000 characters per second.

On a magnetic disc pack 7.25 million characters can be stored and the speed of reading is 144 000 characters per second.

Data on a magnetic tape can only be processed in the sequence in which they are stored on the tape, while magnetic disc allows processing in any sequence, as it provides direct access to the data.

The file organization depends on the computer configuration available, the amount and structure of data and the output required.

The computer installed in WHO is an IBM System/360, Model 30, with card read punch, printer, two magnetic tape units and three magnetic disc units.

The data to be stored were converted to punched cards and organized in four main files.

4.1 The institution file contains in particular the name and address of the institutions. It is stored on magnetic disc.

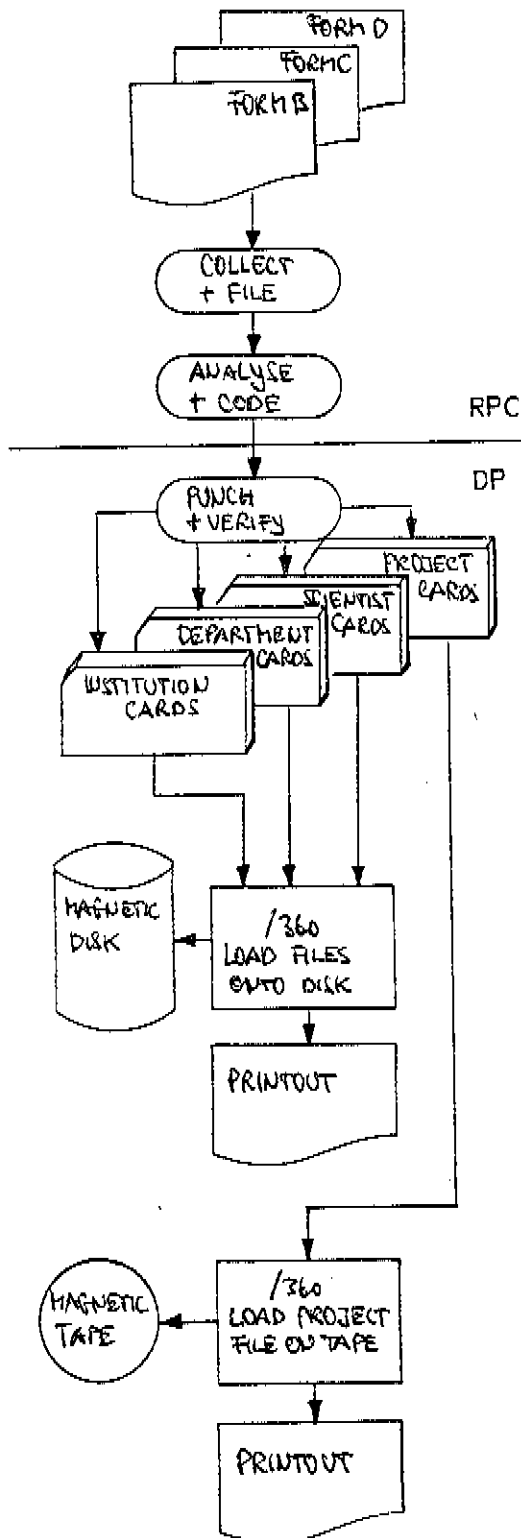
4.2 The department file containing the name and address of the department is also stored on disc.

4.3 The scientist file gives the scientist's name, academic degree, position and other personal data. It is stored on disk.

4.4 The project file being the largest one contains the project titles, several codes for retrieval and the code numbers of all scientists working on a project. This file is always processed sequentially and is stored on a magnetic tape.

The programme can also give a partial printout of institution and department or institution and scientist only, if this is required. The answers are counted. When there are more than one hundred answers to a single query the computer gives a message to this effect, but does not print them, the assumption being that the query was not detailed enough. All the answers may, however, be printed if desired. It takes five minutes to search the project tape which at present contains 5036 projects. Printing time depends on the number of answers found. For example, to process 10 queries and print 20 pages of answers will take about 15 minutes in all.

5 Computer programs and flow of work

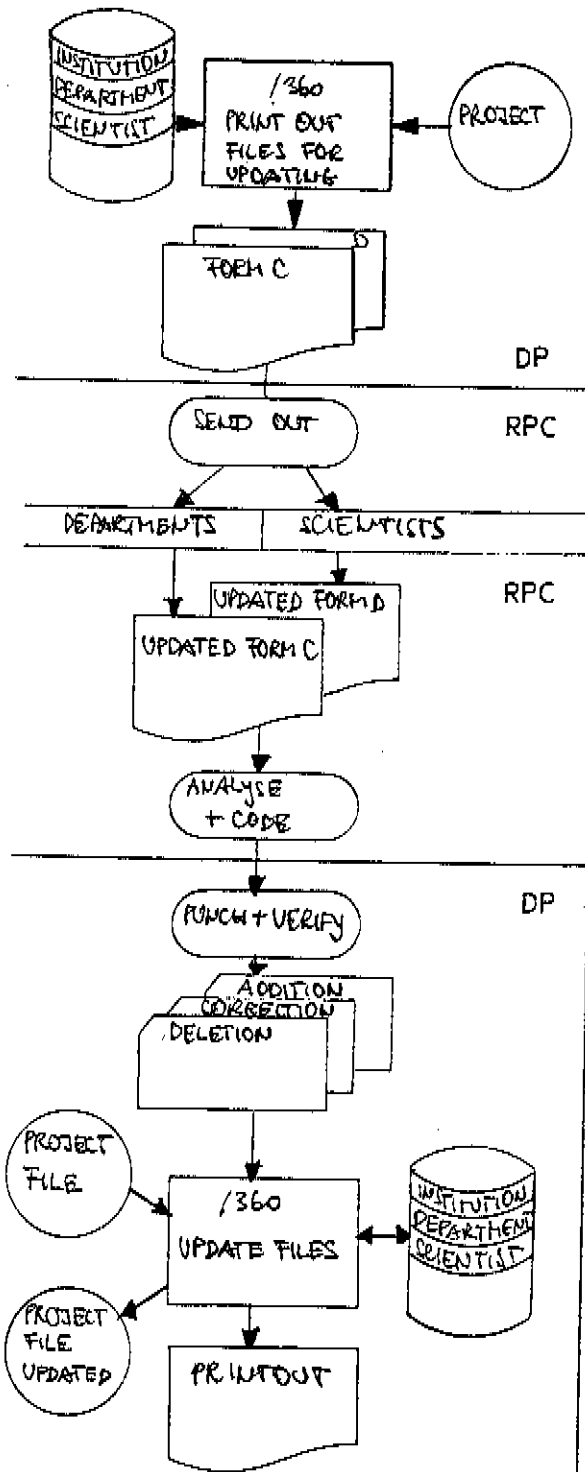


5.1 Initiating the System

The questionnaires (Forms B,C and D) are collected, analyzed and coded by the Office of Research Planning and Coordination. They are transmitted to the Data Processing unit, where the information is punched into cards.

The cards, divided into 4 files - institution, department, scientist and project file - constitute the input to the computer which loads the information on disk or tape.

The load programs also check the cards on completeness and correct sequence. When an error is detected the record is printed and can be corrected.



5.2 Updating the information

The four main files - institution, department, scientist and project file - are printed once a year in a form similar to the original questionnaires. They are sent to departments and scientists to be updated. New projects may be started, project titles changed, other projects deleted. All these changes must be fed into the system.

As the updated information is returned to the Office of Research Planning and Coordination it is analyzed and coded. It is transmitted monthly to the Data Processing unit for punching. The files are then updated either on magnetic disk or on tape by using the various maintain programs.

5.3 The Actual Service

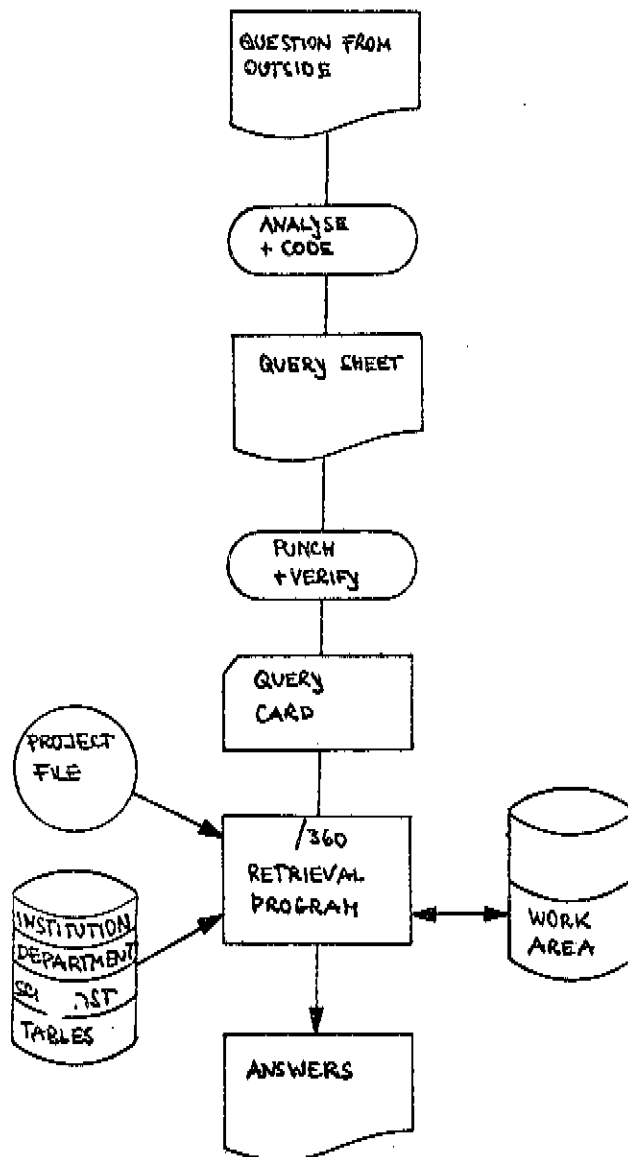
Questions to be addressed to the system are analyzed by the Office of Research Planning and Coordination and coded on special query sheets. These are then transmitted to the Data Processing unit and query cards are punched. The answers are produced by the computer through a universal retrieval program and the print-outs are supplied to the Office of Research Planning and Coordination. This service is normally provided on a daily basis.

The universal retrieval program enables the computer to reply to questions. In principle the question to be answered is: Who is doing what and where?

The program retrieves records from the project file by field of activity, disease orientation, test object, technique used, descriptor, region, country, institution, department, scientist and by combinations thereof. Thus the system can answer more general as well as very specific questions. It gives a printout of the retrieved data. It normally prints:

Name and address of institution
Name of department
Project title
Scientist's name

(see example in Annex 4)



6. FURTHER DEVELOPMENTS

Experience with the established information service so far has been very encouraging. Up to date a total of 1316 queries have been processed and transmitted to scientists, health administrators or other interested persons. At the same time the Office of Research Planning and Co-ordination is proceeding with the collection of information on dental health, human reproduction and cardiovascular research on a world-wide basis. The collected information will be integrated into the existing files step by step, the over-all aim being ultimately to cover all biomedical research in progress throughout the world.

Please return completed form to : WORLD HEALTH ORGANIZATION BIOMEDICAL RESEARCH INFORMATION SERVICE Geneva, Switzerland.	FORM B INSTITUTION ÉTABLISSEMENT Ref. No	Prière de retourner la formule complétée à : ORGANISATION MONDIALE DE LA SANTÉ SERVICE DE RENSEIGNEMENTS SUR LA RECHERCHE BIOMÉDICALE Genève, Suisse
PLEASE TYPE OR WRITE IN BLOCK LETTERS PRIERE D'ECRIRE A LA MACHINE A ECRIRE OU EN MAJUSCULES If the name or address of your institution on the left is incorrect, please enter correct information below : En cas d'erreur, rectifier ci-dessous nom et adresse de votre établissement :		
1. Name and title of scientific director - Nom et titre du directeur scientifique :		Do not write in this column Ne pas écrire dans cette colonne
2. Name and address of the organization to which your Institution is responsible : Nom et adresse de l'organisme dont votre établissement relève :		7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
3. In which of the following categories would you place the organization indicated under 2 ? A laquelle des catégories suivantes rattacheriez-vous l'organisme visé au paragraphe 2 ?	<input type="checkbox"/> National Research Council or Academy Conseil ou Académie nationale <input type="checkbox"/> Educational Institution Etablissement d'enseignement <input type="checkbox"/> Government Department or Ministry Ministère ou organisme public	<input type="checkbox"/> Private Foundation Fondation privée <input type="checkbox"/> Industrial or Commercial Enterprise Entreprise industrielle ou commerciale <input type="checkbox"/> Other (please specify) : Autre catégorie (spécifier) :
4. Functions of your Institution - Fonctions de votre établissement :	<input type="checkbox"/> service - services <input type="checkbox"/> research - recherche <input type="checkbox"/> teaching - enseignement	
5. From which of the following sources are the funds of your institution derived ? Origine des fonds servant à financer l'établissement.	<input type="checkbox"/> National Research Council or Academy Conseil ou Académie nationale <input type="checkbox"/> Educational institution Etablissement d'enseignement <input type="checkbox"/> Government Department or Ministry Ministère ou organisme public	<input type="checkbox"/> Private Foundation Fondation privée <input type="checkbox"/> Industrial or Commercial Enterprise Entreprise industrielle ou commerciale <input type="checkbox"/> Other (please specify) : Autre catégorie (spécifier) :
6. Total annual expenditure from all sources (in local currency) ; Budget annuel total en fonds de toute origine (dans la monnaie du pays) :		
7. Estimated total annual expenditure on research (in local currency) ; Montant estimatif total consacré à la recherche (dans la monnaie du pays) :		
8. Are post-graduate training facilities available at your Institution ? Existe-t-il dans votre établissement des possibilités d'études post-universitaires ?		
9. Total number of scientists on staff of your Institution ; Effectif total du personnel scientifique de votre établissement :		
10. Founding date and short history of your Institution ; Date de fondation et historique sommaire de votre établissement :		
		42 43 44 45 46 47 48 77 78 79 80
		Coded Checked .. Punched Verified

11. **Departments :** Please list below every Department, Institute, Laboratory, Division, or Unit belonging to your Institution, their addresses (if different from that of your Institution) and the names of their Directors.
Départements : Indiquer ci-dessous chaque division, Institut, laboratoire, service ou autre subdivision dépendant de votre établissement, leurs adresses (si celles-ci diffèrent de celle de votre établissement) et le nom des directeurs.

Name and address of Department, Institute, Laboratory, Division, or Unit. Nom et adresse du département, Institut, laboratoire, service ou autre division.	Name of Director or Head. Nom du directeur ou du chef.	Do not write in this column Ne pas écrire dans cette colonne
<p>Date : Signature :</p>		<p>Forms C Issued</p>

Do not write in this column Ne pas écrire dans cette colonne	CURRENT RESEARCH PROJECTS - TRAVAUX DE RECHERCHES EN COURS		Do not write in this column Ne pas écrire dans cette colonne
	Concise title of project Désignation concise du travail	Names of investigators Noms des chercheurs	
Date :		Signature :	
		Coded Checked Punched Verified F. D. issued	

Please return completed form to: WORLD HEALTH ORGANIZATION BIOMEDICAL RESEARCH INFORMATION SERVICE Geneva, Switzerland	FORM D PERSONAL INFORMATION FORM NOTICE PERSONNELLE Ref. No	Prière de retourner la formule complétée à: ORGANISATION MONDIALE DE LA SANTÉ SERVICE DE RENSEIGNEMENTS SUR LA RECHERCHE BIOMÉDICALE Genève, Suisse		
PLEASE TYPE, OR WRITE IN BLOCK LETTERS PRIÈRE D'ÉCRIRE À LA MACHINE À ÉCRIRE OU EN MAJUSCULES If your address on the left is incorrect please enter correct address below. En cas d'erreur, rectifier ci-dessous l'adresse				
1. Surname (Family name) Nom		First name(s) Prénom(s)	DO NOT WRITE IN THIS COLUMN NE PAS ÉCRIRE DANS CETTE COLONNE	
2. Date of birth – Date de naissance day/jour month/mois year/année	3. Sex – Sexe male masculin <input type="checkbox"/> female féminin <input type="checkbox"/>	4. Birth place – Lieu de naissance (City and country – Ville et pays)		41 42 43
5. Nationality Nationalité		6. Country of residence Pays de résidence		44 45 46
7. Education (List the educational institutions you have attended) – Etudes (Indiquer les instituts d'enseignement fréquentés)			47 48 49	
Name and place - Nom et lieu	Subject (e. g. Medicine, Biology, Biochemistry) Sujet (par ex. Médecine, Biologie, Biochimie)	Academic degree(s) and date granted (e. g. Ph. D., 1956) Titre(s) universitaire(s) (par ex. Doctorat en Sciences, 1956)		50 51 52 53
8. Honorary degrees, prizes and awards – Titres et distinctions honorifiques			54 55 56 57	
9. Present Position(s) – Fonctions actuelles (e. g. Professor of Microbiology, University of ... OR Director of Institute; par ex. Professeur de Microbiologie, Université de ... OU Directeur de l'Institut de ... etc.)			58 59 60	
10. Field of specialization (please be specific, e. g. Physiology, Genetics, Pharmacology) Domaines de spécialisation (bien préciser s.v.p. par ex. Physiologie, Génétique, Pharmacologie)	Disease(s) toward which your research is oriented (e. g. Cancer, Tuberculosis) Vers quelle(s) maladie(s) votre recherche est-elle orientée (par ex. cancer, tuberculose)			

QUERY NO 0001

CHEMOTHERAPY OF CANCER METASTASIS

FA34151/FA34231+D0011152/D0011181/D0011251/D0013910/D0013251/D0013151/
D0011910

.....
LONDON CLINIC
ONTARIO CANCER FOUNDATION
VICTORIA HOSPITAL
LONDON ONTARIO
CANADA

DEPARTMENT OF THERAPEUTIC RADIOLOGY
UNIVERSITY OF WESTERN ONTARIO

STUDY OF THE TREATMENT OF HEPATIC METASTASES
BY CONTINUOUS INTRA ARTERIAL INFUSION WITH 5 FUOR

BARTON WALTER BRUCE
WHITE DAVID

FACULTAD DE MEDICINA
UNIVERSIDAD NACIONAL AUTONOMA DE MEXICO
CIUDAD UNIVERSITARIA
MEXICO 20 DF
MEXICO

UNIDAD DE PATOLOGIA

MODIFICACIONES EN LA VIAS Y TIPOS DE METASTASIS EN ENFERMOS
CANCEROSOS TRATADOS CON DIFERENTES QUIMIOTERAPEUTICOS

BRANDT HERMAN

HENRY FORD HOSPITAL
2600 WEST GRAND BD
DETROIT 2 MICHIGAN
US

DIVISION OF ONCOLOGY

CONTINUOUS INTRA ARTERIAL INFUSION OF FLUORINATED PYRIMIDINES
IN THE TREATMENT OF HEPATIC METASTASES

BRENNAN MICHAEL JAMES
BURROWS JOHN H

M D ANDERSON HOSPITAL AND TUMOUR INSTITUTE
UNIVERSITY OF TEXAS
6723 BERTNER AVENUE
HOUSTON 25 TEXAS
US

DEPARTMENT OF MEDICINE

QUERY NO 0001

.....

THE EFFECT OF THIO TEPA AND CYTOXAN ON THE ENDOCRINE SYSTEM
IN METASTATIC BREAST CANCER

MANNHEIMER
COLE V
RUSSELL

MEHARRY MEDICAL COLLEGE
1005 18TH AVENUE NORTH
NASHVILLE 5 TENNESSEE
U S

LABORATORY FOR EXPERIMENTAL ONCOLOGY

IMPLANTATION OF ASCITIC TUMOUR CELLS AND METASTATIC EMBOLI
FROM BODY FLUIDS INTO TISSUES
ITS INHIBITION BY CHEMICALS AND RADIOISOTOPES

GOLDIE H
WALKER M
KAVIC M S

SCHOOL OF MEDICINE
GUNMA UNIVERSITY
280 IWAGAMI CHO
MAEBASHI
JAPAN

SECOND DEPARTMENT OF SURGERY

CHEMOTHERAPY OF STOMACH CARCINOMA WITH LIVER METASTASIS
BY HEPATIC ARTERIAL INFUSION

FUJIMORI MASAO

KANSAI MEDICAL SCHOOL
1 FUMIZONOCHO
MORIGUCHI OSAKA
JAPAN

DEPARTMENT OF SURGERY

EFFECT OF ADJUVANT CHEMOTHERAPY WITH ANTICANCER AGENTS
UPON CANCER METASTASES

YAMADA T