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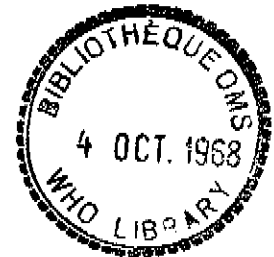
EXPERT COMMITTEE ON EARLY  
DETECTION OF CANCER

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I. PROJECT FOR THE ORGANIZATION OF A PROGRAMME  
FOR CANCER CONTROL IN CHILE

by

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On 5 October 1965, an agreement was made between the Pan American Health Organization (PAHO), the Ministry of Public Health in Chile and the University of Chile, to organize a programme for cancer control in our country.

According to the terms of the agreement, this programme will be directed by the Faculty of Medicine of the University of Chile and will count on the participation of the National Health Service for Employees (MSE), the Chilean League against Cancer and on the technical assistance of PAHO.

Objectives

The main objective of this programme will be the detection and control of cervical-uterine cancer. "Detection" being the diagnosis of the neoplasia in its pre-invasive stages.

The reasons for centralizing the interest around the cervical-uterine cancer are the following:

1. It is the neoplasia with the greatest incidence in our female population (35 per 100 000 women).
2. Its detection in pre-invasive stages can be performed accurately and at a reasonable cost.
3. Adequate treatment of these pre-invasive neoplasias is 100 per cent. successful in preventing its advance to invasive carcinoma.

With these factors in mind, cervical-uterine cancer should be considered a problem of preventive medicine.

Planning

In order to undertake the organization of a programme as proposed, it is indispensable to know certain fundamental aspects about the behaviour of these pre-invasive neoplasias, such as:

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1. Clinically, in 60 per cent. of the cases they do not manifest themselves. In the remaining 40 per cent., the alterations found are not specific.
2. These lesions prevail mainly in young women, between 20 and 40 years of age.
3. Epidemiologically, a prevalence of approximately 6 per cent. of pre-invasive neoplasias of the uterine cervix (dysplasias and carcinoma in situ) should be expected within the adult female population of an uncontrolled community.

From this is gathered that in order to organize a programme of this description, expecting good results, the following conditions are fundamental:

1. A large percentage of the female population should be able to be examined periodically.
2. An adequate system for control of the population, providing a high diagnostic yield, must exist.
3. Operational cost must be low.

Similar programmes developed in other countries (especially Vancouver, B.C., Canada) have proved, through experience, that within a system of socialized medicine, the most efficient organization is obtained with:

1. Centralization of diagnosis and population control

A centralized cytopathological laboratory should be in charge of the cytological and hystopathological diagnosis. This laboratory should also include the necessary secretarial personnel and statisticians required to fulfil a good follow-up and control of the suspicious and positive cases examined.

2. Decentralization in collection of specimens

The specimens examined at the laboratory must be those collected at the level of the out-patient clinics inside and outside the hospitals, private clinics, etc., according to a uniform technique. They can be sent to the laboratory directly or by post.

In this way, the human and material resources existent are used to their utmost, at a lower operational cost.

#### Initial programme or pilot plan

The development of a programme of this description amongst our population will naturally create functional problems and of organization, derived from our local conditions.

In order to know these problems and give them the adequate solution, it is essential to count on an initial phase of this project (initial programme or pilot plan), before making it extensive to the general population.

This initial programme should have a duration of at least three years, during which it will try to comply with the following objectives:

- (1) evaluation of the diagnostic method;
- (2) training of cytotechnologists;

- (3) study and improve the methods for obtaining specimens and for the control of the population; and
- (4) obtainment of rates (prevalence and incidence) of pre-invasive cervical neoplasias (dysplasias and carcinoma in situ).

#### Evaluation of the diagnostic method

In order to evaluate the yield of a programme, as the one proposed, it is fundamental to have an accurate knowledge about the efficiency of the diagnostic method being used. It would be anti-economical to endeavour to apply a method with a high false negative rate.

The evaluation of the method employed (cytology) will be possible through an exhaustive cyto-hystological correlation of all those cases diagnosed as positives by cytology. Biopsies will be performed on every patient having a cytological diagnosis of moderate to advanced dysplasia, carcinoma in situ or invasive carcinoma. This way, at the end of the first year of the programme's activity, an objective appreciation of the results to be expected, when applied on a larger scale, should be attained.

#### Training of cytotechnologists

Due to the need of examining a great volume of women in order to obtain positive results from a cancer detection programme, it is necessary to rely on an adequate number of technical personnel specialized on cytology, or cytotechnologists. They will diagnose all the negative cases which include approximately 90 per cent. of all the cases examined.

In our country this type of personnel is lacking, thus it is necessary to train them. This instruction has been initiated by means of a joint programme with the School of Medical Technology of the University of Chile.

#### Methods of obtaining specimens and of control

The possibilities of a good collection of specimens, and of an adequate control of the population, depend mainly on the knowledge of the problem of "cervical neoplasia", at different levels of the population in general. In this sense, it will be essential to maintain a system of permanent information on the following levels:

1. On a medical level:
  - (a) post-graduates;
  - (b) School of Medicine  
Clinical Chairs (obstetrics and gynaecology)  
Chair of Preventive Medicine  
Chair of Pathology.
2. On a paramedical level:
  - (a) midwives;
  - (b) nurses;
  - (c) sanitary personnel;
  - (d) social workers.

3. On a community level. This point is of great interest, and will be treated in a special way within the programme, and will count on the preferable assistance of the Chilean League against Cancer.

#### Obtainment of rates (prevalence and incidence)

It is absolutely necessary to know the rates corresponding to pre-invasive cervical neoplasias, in order to make an objective evaluation of the results of a cancer detection programme. In this sense, even though the initial planning should be based on the figures given by similar programmes, the evaluation of a determined programme should only be made when its own figures can be considered.

In our country, the rates corresponding to pre-invasive phases of the cervical-uterine carcinoma are totally unknown, but the incidence of invasive carcinoma of the cervix is well-known to be 35.5 per 100 000 women.

The success of a programme of this description will be reflected as progressive diminishment of the incidence rate for invasive carcinomas, previously mentioned. The incidence for pre-invasive neoplasia will remain on a more or less constant level, even though a lowering of the incidence for carcinoma in situ should be expected if dysplasias are to be treated.

For the adequate obtainment of these rates, it is necessary to count on:

- (a) good epidemiological and statistical planning;
- (b) a well-functioning cancer registry; and
- (c) an adequate number of competent secretarial and statistical personnel.

#### Operation of the initial programme

Upon relying on the necessary resources which will be enumerated further along, the programme can be initiated on March 1966.

An important part of these resources is already existent, making it possible to foretell what the achievements of the programme will be during its first year. These will be divided into the following points:

- (1) number of women examined;
- (2) rates expected; and
- (3) instruction of cytotechnologists.

##### 1. Number of women examined

We have calculated that in the first year, 12 000 women will be examined. The estimation of this figure is based on the average yield that is expected of the existent personnel of cytotechnologists and of those in training. This estimate has been reduced 50 per cent., in order to allow an ample margin of security for the initial planning of the programme.

These 12 000 examinations will be distributed amongst beneficiaries of the NHS and MSE, in accordance with the figures stipulated further along, which have been supplied by the representatives of the mentioned services.

National Health Service

The majority of the cases will be provided by this Service, 8400. The specimens will be taken in the following places:

Out-patient clinics for fertility control.

Peripheral out-patient gynaecological and obstetrical clinics.

Directly in the community. This is a project in which the obtainment of specimens will be made by means of direct motivation of the community towards this problem. This part of the programme will be centred in the Northern Hospital Area of Santiago.

National Medical Service of Employees

MSE will provide 3600 cases for the programme's first year. These cases will be taken from the following groups:

Ante-partum and post-partum clinics.

Fertility control clinic.

As can be observed, preference has been given, in both services, to those women who go for pregnancy control, post-partum control, or for fertility control treatment. The reasons for this initial selection are the following:

- (a) they constitute a group easy to control; and
- (b) they all belong to a young age-group and we expect to find amongst them a larger proportion of pre-invasive neoplastic lesions.

The exception is that group in which the specimens will be obtained by direct motivation of the community. The rates obtained in this group will reflect more faithfully what should be expected from the general population, as there will be no selection. On the other hand, this group will reveal more objectively the problems which should be solved before expanding the programme to other areas.

2. Expected Rates

After the programme has functioned for one year, we should be able to have an idea of the prevalence of the pre-invasive cervical neoplasia (dysplasias and carcinoma in situ) amongst our female population.

The estimation of the prevalence expected for this type of lesion is based on our rate for invasive carcinoma (3 per 1000). The figures would be:

	<u>Cases</u>	<u>%</u>
Total number of women examined	12 000	100
Dysplasias	600	5
Carcinoma <u>in situ</u>	120	1
Invasive carcinoma	36	0.3
Negatives	11 244	93.7

These figures are only estimates and are bound to alter, but it is not very probable that they will go down significantly, if our diagnostic method is efficient.

### 3. Instruction of cytotechnologists

As has already been mentioned, this part of the programme will be put into effect by means of a plan in conjunction with the School of Medical Technology of the University of Chile.

The training of a cytotechnologist takes approximately one year before attaining his or her maximum output (approximately 100 cases daily - 20 000 annually), however after four months of instruction they should already be rendering about 50 per cent. of that amount.

A North American instructress of great experience is here on contract to train this personnel. Her contract has been made through the support that PAHO has given to the programme.

The candidates will be selected from students of medical technology, specializing in histopathology and who are to initiate their final six months of practical training. They will receive an intensive training in gynaecological cytopathology and at the same time will work on a thesis, related to the speciality.

The first of these groups will initiate its training as from August 1966. However, due to the urgency of having trained personnel at the briefest possible time, we are in condition to initiate the training of two technicians, who must be on contract as they will be titled professionals, as from March 1966.

This way, towards the end of the programme's first year, we should be able to count on five cytotechnologists, two of whom will be in condition to render between 12 000 and 15 000 examinations each, annually. The remaining three should reach this figure within the following six months.

### Results estimated for the three first years of the programme

In accordance with the programme of instruction of cytotechnologists and counting on the necessary resources, we can forecast the figures for the three years of the initial programme's function:

	First year	Second year	Third year
1. Women controlled	12 000	40 000	90 000
2. Carcinomas <u>in situ</u>	120	280*	500
3. C.T. in training	5	4	4
4. C.T. on duty	2	5	9

\* To estimate these figures it is assumed that all the women of the previous year have returned for a check-up that year. This way the positive cases treated will be negative in the following controls.

### Necessary resources for the first functioning year of the programme

The planning of the programme for the following years should be made on the same basis already mentioned, and objectively considering the results obtained in its initial phase.

For this it is indispensable to count on the minimum necessary resources, so much of personnel, material, equipment and laboratory space. In this sense, this programme has the great advantage of centralizing the efforts and resources of the various institutions interested in the problem, which not only means less individual support, but also a lower total cost.

We shall now enumerate the necessary resources for the initiation of the programme and its first year of function, in accordance with that exposed in the previous paragraphs.

In first place the already existing resources which correspond to the University of Chile and Pan American Health Organization's support, will be indicated. At the end will be found a list of personnel, material and equipment required, which should be provided by NHS and MSE.

#### Existing resources

##### 1. Contribution of Pan American Health Organization

(a) US\$ 6000 for salaries of specialized personnel. The major part of this sum has been destined to the contract of a North American cytotechnologist who will be in charge of instructing our technical personnel. The remaining portion of this sum is to be employed for the remuneration of specialized technical or secretarial work.

(b) US\$ 4000 for material and equipment. The importation of material and equipment impossible to obtain in the country and needed with urgency has been solicited with these funds.

(c) Short-term fellowships for advanced instruction overseas of the professional medical and paramedical personnel who work directly on the programme (two per year).

(d) Technical consultants for short terms.

##### 2. University of Chile's support

(a) Laboratory. The University of Chile has provided the space for the laboratory of cytopathology which will centralize the diagnostic activities (cytology and pathology), as well as the follow-up and control of the suspicious and positive cases. This space is sufficient for the first two years of the programme's functioning; later it will have to be enlarged in accordance with its needs.

(b) Personnel. The Faculty of Medicine supplies the Head of the aforementioned Cytopathological Service. It is a full-time cytopathologist's assignment, with the responsibility of directing the programme.

(c) Material and equipment. The University of Chile will provide, through the J. J. Aguirre Hospital, a certain amount of equipment and laboratory material, such as:

five binocular microscopes;

glassware and reagents at its disposal.

##### 3. NHS and MSE's support

It is estimated that the following figures should correspond roughly to the support to be given by NHS and MSE:

Personnel salaries

(a)	medical	E <sup>o</sup> 9 500	
(b)	cytotechnologists	E <sup>o</sup> 24 000	
(c)	secretarial	E <sup>o</sup> 12 000	
(d)	service	E <sup>o</sup> 3 000	
		<u>E<sup>o</sup> 48 500</u>	E <sup>o</sup> 48 500

Laboratory material

(a)	specified material	E <sup>o</sup> 27 000	
(b)	miscellaneous	E <sup>o</sup> 2 500	
		<u>E<sup>o</sup> 29 500</u>	E <sup>o</sup> 29 500

Secretarial material

(a)	specified material	E <sup>o</sup> 8 000	
(b)	miscellaneous	E <sup>o</sup> 4 000	
		<u>E<sup>o</sup> 12 000</u>	E <sup>o</sup> 12 000
			<u>Total E<sup>o</sup> 90 000</u>

Taking into consideration that from the total volume of examinations calculated for the programme's first year of function (12 000), approximately two-thirds will correspond to beneficiaries of the SNS and one-third to those of MSE, the support of each one of these Services should be given in proportion to the total value of the amount assigned (E<sup>o</sup> 90 000).

In this way, the supports of both services would be the following:

National Health Service	E <sup>o</sup> 60 000
National Medical Service of Employees	E <sup>o</sup> 30 000
	<u>Total E<sup>o</sup> 90 000</u>

Herewith we propose a way of distributing the support of both Services, in accordance with the proportion assigned to each one:

National Health Service

1. Personnel

1 physician, two hours	E <sup>o</sup> 4 750
1 cytotechnologist (full-time)	E <sup>o</sup> 12 000
2 secretaries	E <sup>o</sup> 12 000
1 service employee	E <sup>o</sup> 3 000
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	E <sup>o</sup> 31 750

2. Material and equipment

(a) laboratory	E <sup>o</sup> 20 250
(b) secretarial	E <sup>o</sup> 8 000
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	E <sup>o</sup> 28 250

Total E<sup>o</sup> 60 000

National Medical Service of Employees

1. Personnel

1 physician, two hours	E <sup>o</sup> 4 750
1 cytotechnologist (full-time)	E <sup>o</sup> 12 000
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	E <sup>o</sup> 16 750

E<sup>o</sup> 16 750

2. Material and equipment

(a) laboratory	E <sup>o</sup> 9 250
(b) secretarial	E <sup>o</sup> 4 000
	<hr/>
	E <sup>o</sup> 13 250

E<sup>o</sup> 13 250

Total E<sup>o</sup> 30 000

Summary of the supports given by the different institutions for the cancer control programme (during its first functioning year)

An approximate value of the supports to be given by the Institutions that participate in this programme will be included.

1. Pan American Health Organization

Salaries of specialized personnel	US\$ 6 000	approx. E <sup>o</sup> 24 000
Imported material and equipment	US\$ 4 000	approx. E <sup>o</sup> 16 000
Fellowships (2)	US\$ 4 800	approx. E <sup>o</sup> 19 200
Technical consultants	US\$ 1 800	approx. E <sup>o</sup> 7 200
Approximate total	<u>US\$ 16 600</u>	approx. <u>E<sup>o</sup> 66 400</u>

2. University of Chile

Personnel (Medical Director of Programme)		E <sup>o</sup> 22 500
Laboratory and installations		E <sup>o</sup> 25 000
Laboratory equipment and material		<u>E<sup>o</sup> 15 000</u>
Total approximate support of the University of Chile		<u>E<sup>o</sup> 62 500</u>

3. National Health Service

Estimated support according to information attached		<u>E<sup>o</sup> 60 000</u>
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4. National Medical Service of Employees

Estimated support according to information attached		<u>E<sup>o</sup> 30 000</u>
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Chilean League against Cancer

The participation of this institution will facilitate and co-ordinate the work of revealing the programme amongst different levels of the community.

This is one of the most important factors in developing a programme of this description effectively. However, it is not advisable to divulge a cancer control programme until the adequate human and material resources necessary for absorbing a great volume of diagnostic work, have been provided.

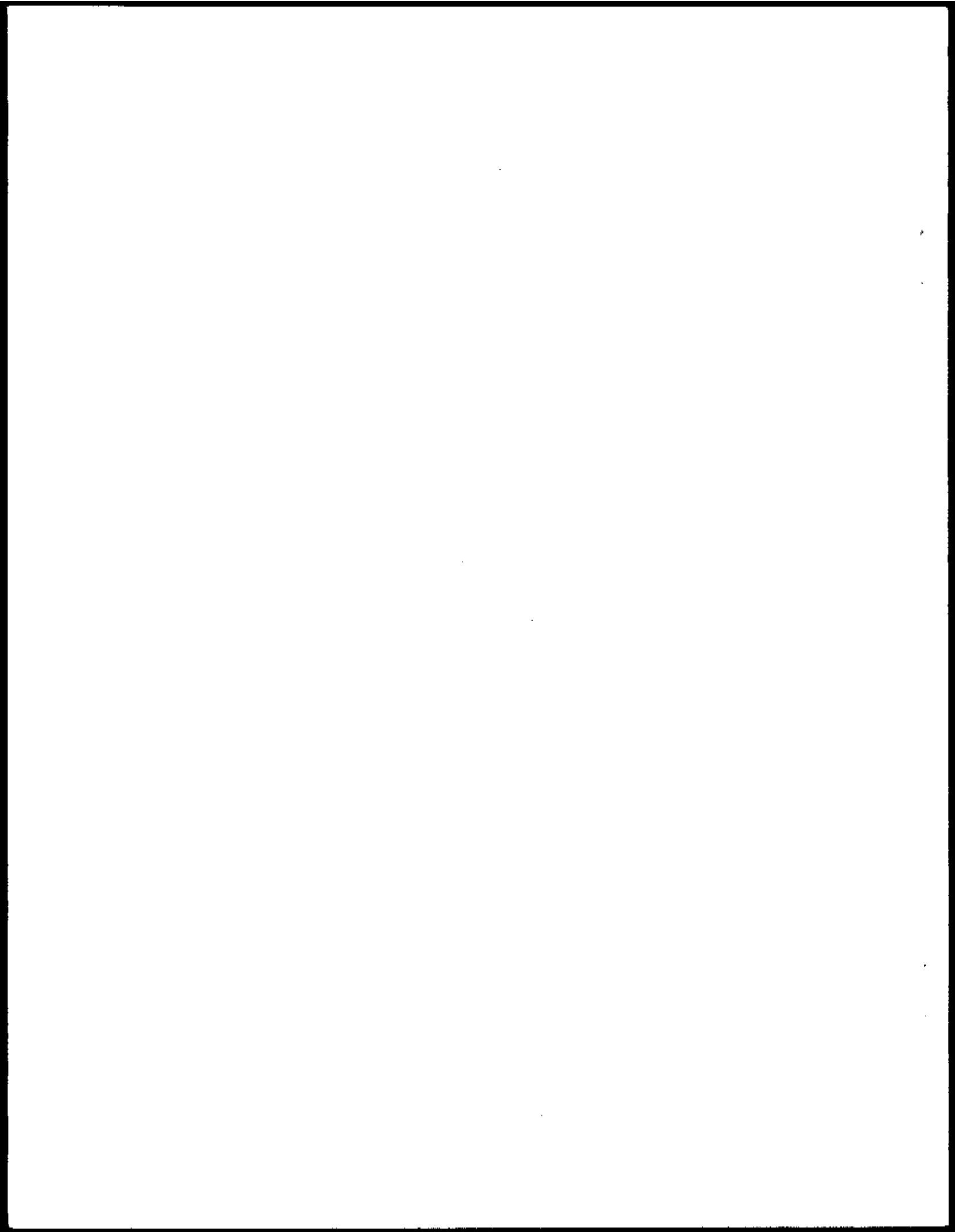
During this initial stage of the programme, the Chilean League should collaborate in the study of the most adequate methods to be used in introducing the programme to different levels of the population. In this sense, its collaboration will be of great value in the development of an experimental project at the level of districts in the Northern Hospital Area of Santiago.

According to the terms of the agreement drawn up for the organization of this programme, the resources provided by the various participants in the programme will be administered by the Faculty of Medicine of the University of Chile. The Head of the Cytopathological Service of this Faculty will be directly responsible for the distribution of these resources, and for the technical direction and functioning of the programme.

Any fundamental change in the programme and the eventual incorporation of other institutions should be approved by the committee of directors, which consists of the representatives appointed by the participating institutions, before the Ministry of Public Health.

With the object of obtaining the best benefit from the resources provided to this programme by the PAHO, it is indispensable that the project should be initiated on 1 March 1966, at the latest, as the foreign instructress's contract terminates in November this year, and we cannot be certain that she would be interested to renew it. For this reason it is absolutely essential that by then we should already have five trained cytotechnologists.

For the reasons mentioned, we consider it of fundamental importance that the Technical Counsels of NHS and MSE decide as soon as possible on the support of the respective Services to the programme, in accordance with the resources requested in the adjoining text, and which are the minimum. Once the support has been agreed upon, these resources should be at the disposal of the Faculty of Medicine of the University of Chile, following the established modes for this type of agreement.



## 2. Correlation between cytologic and histologic diagnoses in patients with carcinoma in situ

This study was made in a group of 67 patients with a diagnosis of confirmed carcinoma in situ.

<u>Cytologic diagnosis</u>	<u>No.</u>	<u>%</u>
Invasive carcinoma	2	3.0
Carcinoma <u>in situ</u>	49	73.0
Advanced dysplasia	9	13.5
Moderate dysplasia	6	9.0
Mild dysplasia	1	1.5
Normal	0	0.0

As can be seen from the above figures, the cytological diagnosis of carcinoma in situ in our laboratory is quite accurate. In 75 per cent. of the cases the cytological diagnosis was carcinoma in situ and in 13 per cent. the diagnosis was advanced dysplasia, which is considered to be the stage of intraepithelial neoplasia immediately preceding carcinoma in situ. In two cases the cytological diagnosis was invasive carcinoma. There was no case with normal cytology.

## 3. Age distribution of 22 464 women screened

The following analysis was effected with the first 22 464 women screened, whose age fluctuated between 18 and 78 years, the average age being 34.5 years.

<u>Cytologic diagnosis</u>	<u>No. of women</u>	<u>%</u>	<u>Aver. age</u>
Negative	21 963	97.83	30.60
Dysplasia	279	1.24	30.45
Carcinoma <u>in situ</u>	169	0.75	34.76
Invasive carcinoma	53	0.24	49.62
Total women screened	22 464	100	34.49

## 4. Laboratory yield

At present 300 examinations daily are being effected by four well-trained cytotechnicians (with over 18 months training), and by two technicians with practice of less than one year. The former yield an average of 70 examinations daily each, the latter, about 30 each. The instruction of further four cytotechnicians has been initiated. Thus, we believe that within six months we will be able to duplicate our present yield.

## COST OF THE PROGRAMME

The estimated cost per woman screened, including 1.2 cytological examinations for each patient along with two biopsies in the positive cases detected within the laboratory, has been the following:

First year (1966)	US\$ 2.5
Second year (1967)	US\$ 1.8
Third year (1968)	US\$ 1.4

## COMMENTS

Public and professional education is being organized through co-ordinated programmes by the Faculty of Medicine and the Chilean League against Cancer. During the next period, special attention will be given to the above aspects of the programme.

## II. THE CANCER DETECTION PROGRAMME IN CHILE

### (Preliminary information)

#### INTRODUCTION

As has been stated in previous reports, the programme originated in an Agreement between the Chilean Government, the Pan American Health Organization and the University of Chile. The Agreement was signed on 5 October 1965, and the programme was put into action on 1 March 1966.

The figures shown here are to be regarded merely as general information of results obtained until 31 March of the present year. Detailed information of results will be published in the near future.

#### THE CYTOLOGY LABORATORY

As was pointed out in the original project, the programme operates fundamentally by means of a central laboratory that receives smears from various specimen collection centres. It is the function of this laboratory to centralize the diagnoses of cervical smears and to follow-up the positive cases through a permanent connexion with the specimen collection centres. Furthermore, the laboratory fulfils specific teaching functions as regards the instruction of cytotechnologists.

Within the laboratory, the histopathology section is dedicated primarily to the study of punch biopsies and cone biopsies of the cervix pertaining to cytologically positive patients. This section of the laboratory processes nearly 50 per cent. of the cone biopsies effected in the course of this programme, and at the same time gives technical assistance to histopathology laboratories in other hospitals, thus allowing uniformity in diagnostic criteria.

#### RESULTS OBTAINED UNTIL 31 MARCH 1968

##### 1. Population examined

Total of cytological examinations	44 369
Total of women screened	37 681
Average smears per woman screened	1.17

<u>Cytologic diagnosis</u>		<u>%</u>
Normal	34 767	92.27
Doubtful	2 070	5.49
Dysplasia	512	1.36
Carcinoma <u>in situ</u>	267	0.71
Invasive carcinoma	65	0.17
Total positive cytologies	844	2.24