



BC Cancer Agency
CARE & RESEARCH

An agency of the Provincial Health Services Authority

**CERVICAL CANCER
SCREENING PROGRAM**

2006 ANNUAL REPORT

Published by: The Cervical Cancer Screening Program
Administration Office
8th Floor, 686 West Broadway
Vancouver, BC V5Z 1G1
Phone: (604) 877-6200
Fax: (604) 660-3645
Website: www.bccancer.bc.ca/PPI/Screening/Cervical

March 2007

TABLE OF CONTENTS

INTRODUCTION.....	1
PROGRAM RESULTS.....	3
UTILIZATION	3
PARTICIPATION RATES.....	5
SCREENING INTERVAL	6
QUALITY OF SMEARS.....	7
CERVICAL SMEAR RESULTS.....	8
FOLLOW-UP OF ABNORMALS	10
PROVINCIAL COLPOSCOPY PROGRAM	13
CANCER STATISTICS	14
INVASIVE SQUAMOUS CARCINOMA	15
ADENOCARCINOMA	16
HUMAN PAPILLOMAVIRUS (HPV) AND CERVICAL CANCER.....	17
ACKNOWLEDGMENT	18
CONTRIBUTORS	19
PUBLICATIONS	20
SCREENING PROGRAM OVERVIEW	21
CCSP SCREENING RECOMMENDATIONS.....	23
COLPOSCOPY CLINIC LOCATIONS AND PERSONNEL STAFFING.....	24
EDUCATIONAL MATERIAL	26
REQUEST FOR EDUCATIONAL MATERIAL	27



TABLES

Table I	Smears Received by Age Group: 2005	3
Table II	Patients by Age Group: 2005.....	4
Table III	Number of Smears in Patients with Cervical/Endocervical Smears: 2005	4
Table IV	Participation Rates (%) by Age Groups July 2003 - December 2005.....	5
Table V	Cumulative Numbers and Proportions Rescreened	6
Table VI	Smear Quality by Age Group: 2005.....	7
Table VII	Distribution of Cytology Findings by Age Group Based on Patient's Last Cervical/Endocervical Smear in 2005.....	8
Table VIII	Significant Atypia Rates (per 1000) by Age Group Based on Patient's Last Cervical/Endocervical Smear in 2005.....	9
Table IX	Follow-up Recommendation by Age Group Based on Patients with Finding of Mild or Higher Atypia in 2005	10
Table X	Most Severe Histological Diagnosis within One Year of Last Cervical/Endocervical Pap Smear of 2004.....	12
Table XI	Invasive Cervical Cancers by Age Group	14
Table XII	Screening History for Invasive Squamous Cell Cervical Cancer Patients by Age Group: 2004	15
Table XIII	Screening History for Invasive Adenocarcinoma Cervical Cancer Patients by Age Group: 2004	16

FIGURES

Figure 1	Age Standardized Incidence and Mortality Rate of Invasive Cervical Cancer in BC.....	2
Figure 2	Rescreening Rate for 2002 Patients by Recommended Interval.....	6
Figure 3	Level of Compliance to Colposcopy Recommendation by Age Group Patient's Last Cervical/Endocervical Smear in 2005.....	11
Figure 4	Reason for Referral to Colposcopy Clinic: 2005.....	13
Figure 5	Site of Colposcopic Investigation: 2005.....	13



INTRODUCTION

Cervical cancer screening is at a critical juncture. The current paradigm, based on cervical cancer smears or “Pap” tests has been very effective in reducing the incidence of cervical cancer. Knowledge gained over the past two decades identified the pivotal role of Human Papilloma Virus (HPV) infection in the cascade of events leading to cervical carcinoma. With the advent of accurate HPV tests and vaccines effective against an important subset of HPV types there is an urgent need to develop cost effective strategies to incorporate HPV testing and vaccination in existing screening programs. Even as we move to incorporate new technologies, we are reminded that effective cervical cancer screening is dependent on the participation of every woman at risk.

The Cervical Cancer Screening Program of British Columbia (CCSP) in partnership with the BC Centre for Disease Control along with a team of national and international experts in the field have obtained research funding to conduct a 7-year study into the use of HPV testing in the setting of an established screening program. The outcome of this trial should inform decisions about the best strategy to introduce HPV testing in BC. Study recruitment is scheduled to begin in July 2007.

The CCSP redeveloped educational material for women in 2006. Two new brochures provide information on the importance of regular pap tests (Cervical cancer – protecting yourself with regular pap tests) and on HPV (HPV & cervical cancer – what you should know and do). Two additional booklets provide more in-depth information that can be used for further discussion between physicians and patients: “Preventing cervical cancer”, and “Abnormal Pap test results”.

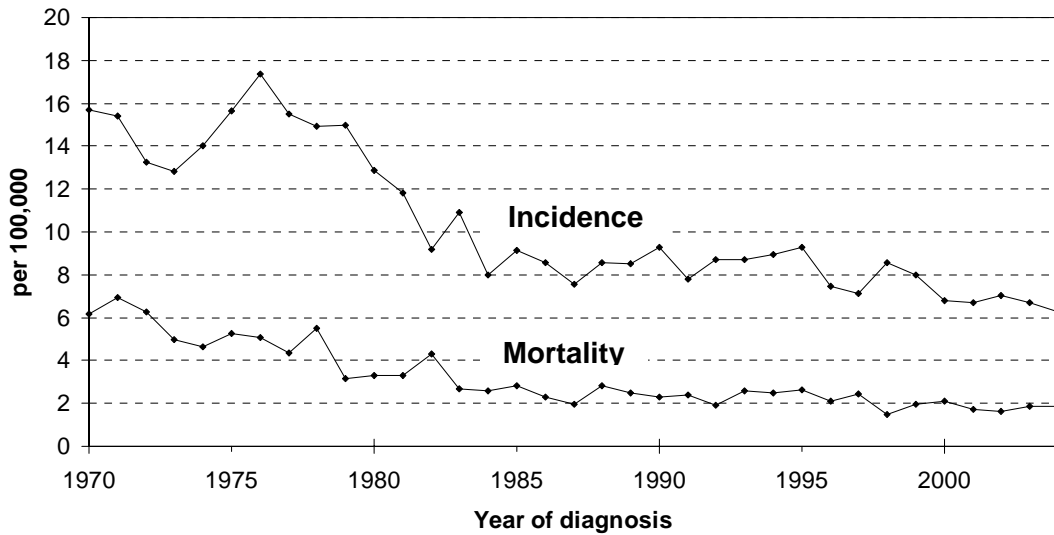
The year 2007 will also see an advertising campaign aimed at increasing the participation of women aged 20 to 29 in cervical cancer screening. Evaluation of data collected over an eight year period has shown a decrease in participation in this age group. This result was presented in the last CCSP Annual Report.

Program results from 2005 are presented in this report. Overall, the Cervical Cancer Screening Laboratory processed a total of 590,090 smears in 2005, obtained from 552,212 women. Less than 1% of all smears were reported as unsatisfactory for interpretation, 3.8% showed mild atypia and 0.9% showed moderate atypia or worse. Although women in the screening program generally comply with recommendations to have repeat testing, the follow up interval generally is longer than recommended. Ultimately 81% of women have a repeat cervical smear within 36 months.

In 2005, 12,472 colposcopy examinations were provided by the Provincial Colposcopy Program. Adherence to colposcopy recommendations were 80% for patients with cytological result of moderate atypia or worse. 58.3% of patients with moderate atypia or worse finding received a histological diagnosis of CIN II or higher from pathology specimens taken within one year of the cytology result.

Since 1960 when the CSSP was introduced, the incidence and mortality rates of cervical cancer have dropped by over 70%. In 2004, 147 women in BC were diagnosed with cervical cancer. Figure 1 shows that the decline in the age standardized incidence rate has slowed since 1980's. Improvement in screening participation rate has the potential to provide further reduction. However, statistics on squamous cell carcinomas diagnosed in 2004 showed that over 40% had a Pap test within 1-5 years. Thus, further significant improvement will require more dramatic changes: change in screening technology and/or prevention practice. HPV testing and vaccine hold the potential for change.

Figure 1
Age Standardized Incidence and Mortality Rate of Invasive Cervical Cancer in BC



* Rates are standardized to the 1991 Canadian population.

PROGRAM RESULTS

Utilization

The Cervical Cancer Screening Program (CCSP) received a total of 590,090 gynecological smears from BC health care professionals in 2005. Health care professionals who submitted smears include gynecologists, general practitioners, midwives, naturopaths, nurses, etc. An additional 4,840 smears were submitted from outside of BC, of which the majority originated in the Yukon Territory. The following program results include smears from British Columbia only.

**Table I
Smears Received by Age Group: 2005**

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Number of Smears	27,612	121,408	138,691	142,430	102,552	48,839	8,558	590,090
Smears from Cervix/Endocervix (%)	27,578 (99.8)	121,243 (99.8)	137,583 (99.2)	137,515 (96.5)	94,191 (91.8)	42,392 (86.7)	5,985 (69.9)	566,487 (96.0)
Smears from Other Sites (%)	34 (0.1)	165 (0.1)	1,108 (0.7)	4,915 (3.4)	8,361 (8.1)	6,447 (13.2)	2,573 (30.0)	23,603 (3.9)

Table I shows the number of smears received and age distribution. Smears from “other sites” are those without any cells taken from the cervix or endocervix. The population of women screened by the CCSP includes clinically asymptomatic women (routine screening), follow-up screening for women with previously detected abnormalities, and a small percentage of symptomatic women.

**Table II
Patients by Age Group: 2005**

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Number of Patients	25,367	110,866	127,870	134,993	98,096	46,926	8,094	552,212
With Smears from Cervix/Endocervix Site (%)	25,358 (99.9)	110,783 (99.9)	126,954 (99.2)	130,522 (96.6)	90,358 (92.1)	41,006 (87.3)	5,779 (71.3)	530,760 (96.1)
With Smears from non Cervix/Endocervix Site (%)	9 (0.0)	83 (0.0)	916 (0.7)	4,471 (3.3)	7,738 (7.8)	5,920 (12.6)	2,315 (28.6)	21,452 (3.8)

Table II shows the number of patients who had Pap smears. The numbers of patients is given in total, and by patients with smears from the cervix or endocervix and those with smears only from other sites.

**Table III
Number of Smears in Patients with Cervical/Endocervical Smears: 2005**

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Number of Patients	25,358	110,783	126,954	130,522	90,358	41,006	5,779	530,760
with 1 Smear (%)	23,698 (93.4)	100,937 (91.1)	116,493 (91.7)	123,706 (94.7)	86,439 (95.6)	39,589 (96.5)	5,564 (96.2)	496,426 (93.5)
with 2 Smears (%)	1,587 (6.2)	9,440 (8.5)	10,066 (7.9)	6,563 (5.0)	3,775 (4.1)	1,364 (3.3)	201 (3.4)	32,996 (6.2)
with 3+ Smears (%)	73 (0.2)	406 (0.3)	395 (0.3)	253 (0.1)	144 (0.1)	53 (0.1)	14 (0.2)	1,338 (0.2)
New Patients (%)	13,670 (53.9)	19,455 (17.5)	8,700 (6.8)	4,606 (3.5)	2,390 (2.6)	1,225 (2.9)	281 (4.8)	50,327 (9.4)

Table III shows the number and percentage of women having one, two, and three or more cervical/endocervical smears in the given year. Also shown is the number of women being screened by the CCSP for the first time, and the percentage they represent of all women screened.

Participation Rates

The CCSP recommends that women begin Pap smear screening for cervical abnormality when they become sexually active or soon thereafter, and stop screening at age 69 if no significant abnormality was detected during their screening history. Most women follow a one-year to two-year screening interval. Thus, participation rates for the CCSP are calculated as the percent of women with at least one cervical/endocervical smear in a 30-month period.

The CCSP does not currently collect patient residential information from the health care providers who submit the Pap smears for interpretation. Linkage with the Ministry of Health Client Registry is necessary to provide the data to calculate the regional participation rates. Unfortunately, this linkage was not possible this year. Thus, only province-wide participation rates are available.

Table IV
Participation Rates (%) by Age Groups
July 2003 - December 2005

	Age (years)							Age 20-69
	<20	20-29	30-39	40-49	50-59	60-69	70+	
British Columbia overall	8.5	63.8	71.6	63.8	51.8	39.4	5.7	59.8
Adjusted for Hysterectomy	8.5	63.8	77.8	80.7	77.3	63.6	8.8	73.6

Notes:

- Population data was acquired through the Health Data Warehouse, BC Ministry of Health
- Hysterectomy rates were estimated from a population sample of an epidemiological study conducted in 1995

Table IV lists the 10-year age group breakdown of participation rates for the 30-month period ending on December 31 in the year of this report. Participation is shown based on the entire BC population, and also adjusted for hysterectomies. The hysterectomy adjustment is based on the estimated age specific hysterectomy rates to exclude women without a cervix.

Screening Interval

Repeat interval recommendations were given based primarily on the current smear result and cytology history, but might be influenced by the patient's clinical condition. In order to have sufficient follow-up time, the last smear per patient taken in 2002 was used in the screening interval analyses. Figure 2 shows the return rate by repeat interval recommendation. Patients with mild atypia were generally given a 6-month repeat recommendation.

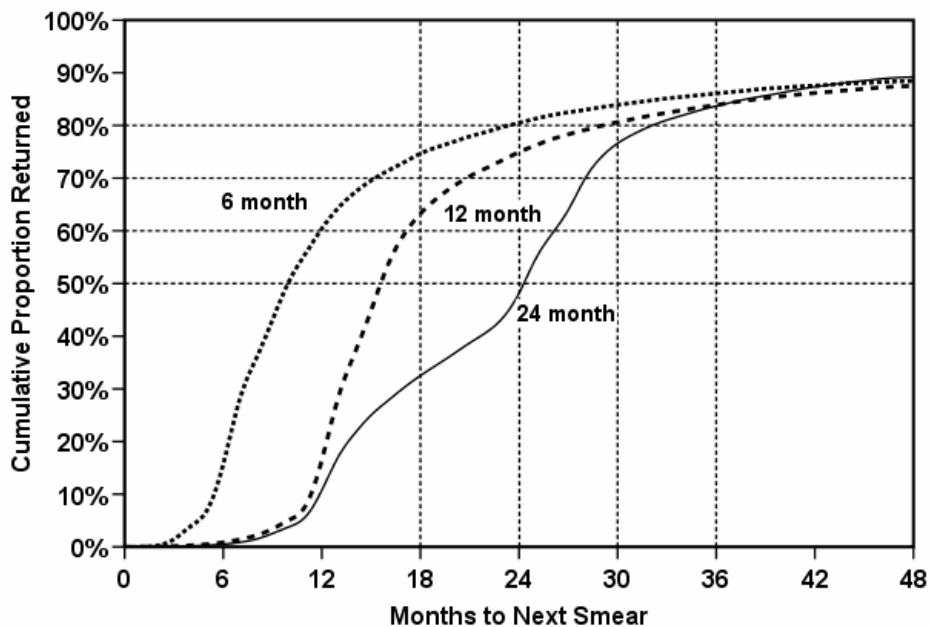
Patients with a cytological finding of moderate or higher atypia have a recommendation for further investigation. Thus, the rescreening rate was examined for patients with satisfactory smears and no finding of moderate or higher atypia.

Table V
Cumulative Numbers and Proportions Rescreened

Year of previous screen	2000	2001	2002
No. of patients	562,740	538,115	547,017
Rescreened			
by 18 months	50%	54%	53%
by 24 months	62%	65%	65%
by 30 months	73%	76%	77%
by 36 months	77%	80%	81%

*patients with unsatisfactory or moderate+ atypia smears were excluded.

Figure 2
Rescreening Rate for 2002 Patients by Recommended Interval



* Patients with unsatisfactory or moderate+ atypia smears were excluded

Quality of Smears

The adequacy of a smear for interpretation is assessed as follows: satisfactory for interpretation, satisfactory but limited for interpretation, and unsatisfactory. The “unsatisfactory” category is used when the smear quality is inadequate for an interpretation. In general, the “satisfactory but limited” category is used when the smear quality is not ideal but still possible to interpret. In previous reportings of CCSP smear quality, “no endocervical cells” was considered “satisfactory but limited” for interpretation. It has been summarized in the “satisfactory” category since the 2004 report. The absence of endocervical, transformation zone component continues to be noted on the cytology report.

Table VI
Smear Quality by Age Group: 2005

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Cervical/Endo cervical Smears	27,578	121,243	137,583	137,515	94,191	42,392	5,985	566,487
Unsatisfactory (%)	316 (1.1)	1,376 (1.1)	1,531 (1.1)	1,047 (0.7)	1,117 (1.1)	779 (1.8)	125 (2.0)	6,291 (1.1)
Limited for Interpretation (%)	526 (1.9)	2,689 (2.2)	3,039 (2.2)	2,543 (1.8)	1,613 (1.7)	730 (1.7)	90 (1.5)	11,230 (1.9)

Table VI summarizes smear quality by 10-year age groups separately for cervical/endocervical smears.

The most commonly cited factor, for approximately 70% of smears of unsatisfactory quality, is scanty smear material. Scanty smear material is especially common in the older age groups. The next most cited reason is inflammatory exudate. Multiple factors may be cited.

The most commonly cited factor for smears which are limited for interpretation is inflammatory exudate, followed closely by scanty smear.

Cervical Smear Results

Results of the last cervical/endocervical smear of the year for each patient are summarized in Table VII. Whenever multiple atypia findings were reported on the same smear, the most severe finding was used.

Table VII
Distribution of Cytology Findings by Age Group Based on Patient's Last Cervical/Endocervical Smear in 2005

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Number of Patients	25,358	110,783	126,954	130,522	90,358	41,006	5,779	530,760
Unsatisfactory (%)	214 (0.8)	988 (0.9)	1,052 (0.8)	712 (0.5)	739 (0.8)	547 (1.3)	99 (1.7)	4,351 (0.8)
Limited for interpretation (%)	366 (1.4)	2,051 (1.9)	2,407 (1.9)	2,042 (1.6)	1,380 (1.5)	644 (1.6)	79 (1.4)	8,969 (1.7)
Negative* (%)	21,796 (85.9)	95,880 (86.5)	113,509 (89.4)	116,041 (88.9)	82,924 (91.8)	38,404 (93.6)	5,343 (92.5)	473,897 (89.3)
"No endocervical cells "	298	1,453	1,800	2,209	253	1	.	6,014
Reactive changes (%)	545 (2.1)	2,426 (2.2)	2,706 (2.1)	3,676 (2.8)	2,197 (2.4)	704 (1.7)	127 (2.2)	12,381 (2.3)
Mild atypia (%)	1,780 (7.0)	6,103 (5.5)	4,276 (3.4)	5,051 (3.9)	2,518 (2.8)	550 (1.3)	81 (1.4)	20,359 (3.8)
<i>No significant atypia** in past 2 yrs</i>	1,339	4,050	2,938	3,333	1,645	377	59	13,741
<i>Significant atypia** in past 2 yrs</i>	441	2,053	1,338	1,718	873	173	22	6,618
Moderate or higher atypia (%)	359 (1.4)	1,882 (1.7)	1,204 (0.9)	791 (0.6)	347 (0.4)	156 (0.4)	50 (0.9)	4,789 (0.9)
<i>No significant atypia** in past 2 yrs</i>	261	1,203	778	520	215	121	35	3,133
<i>Mild atypia only in past 2 years</i>	66	392	228	162	86	13	4	951
<i>Moderate or higher atypia in past 2 years</i>	32	287	198	109	46	22	11	705

* include "no endocervical cells"

** significant atypia – mild or higher atypia

Table VIII
Significant Atypia Rates (per 1000) by Age Group
Based on Patient's Last Cervical/Endocervical Smear in 2005

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Number of Patients	25,358	110,783	126,954	130,522	90,358	41,006	5,779	530,760
Squamous:								
Mild (ASC-US/LSIL)	69.3	52.4	28.0	28.9	19.2	9.4	8.6	32.1
Moderate+ (HSIL)	13.8	16.1	8.3	4.5	1.9	1.8	2.7	7.6
Atypical (of unspecified significance)	0.3	0.6	0.3	0.4	1.3	2.1	5.1	0.8
Glandular:								
Mild	0.5	2.2	5.1	9.2	8.0	3.6	3.4	5.6
Moderate (High grade)	0.0	0.1	0.3	0.7	1.0	0.9	2.4	0.5
Marked+ (High grade)	0.0	0.0	0.0	0.0	0.2	0.4	2.5	0.1
Epithelial:								
Mild (Low grade)	0.2	0.4	0.5	0.4	0.6	0.3	1.9	0.5
Moderate+ (High grade)	0.1	0.6	0.7	0.6	0.5	0.5	0.8	0.6

ASC-US – atypical squamous cells of undetermined significance
 LSIL – low grade squamous intraepithelial lesion
 HSIL – high grade squamous intraepithelial lesion

Table VIII shows the significant atypia rates (per 1000 patients) by 10-year age group. Rates are presented by cell type and level of significance. Squamous cell type is the most common. Atypical squamous cells of undetermined significance / low-grade squamous intraepithelial lesion (ASC-US/LSIL) is more frequently reported in the younger women.

Follow-up of Abnormals

Follow-up Recommendation

The current CCSP practice is to follow mild atypia with repeat smear at 6-month intervals for up to two years. Patients with persistent mild atypia are then advised to have a colposcopy. Other procedures may be recommended on the basis of patient's clinical condition and cytology history.

Table IX
Follow-up Recommendation by Age Group
Based on Patients with Finding of Mild or Higher Atypia in 2005

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Patients With Mild Atypia on Last Smear	1,780	6,103	4,276	5,051	2,518	550	81	20,359
Repeat in 6 months (%)	1,718 (96.5)	5,672 (92.9)	3,984 (93.1)	4,500 (89.0)	2,183 (86.6)	470 (85.4)	67 (82.7)	18,594 (91.3)
Other investigation* (%)	62 (3.4)	431 (7.0)	292 (6.8)	551 (10.9)	335 (13.3)	80 (14.5)	14 (17.2)	1,765 (8.6)
Patients with Moderate or Higher Atypia	359	1,882	1,204	791	347	156	50	4,789
Colposcopy and/or ECC (%)	328 (91.3)	1,812 (96.2)	1,147 (95.2)	688 (86.9)	233 (67.1)	84 (53.8)	20 (40.0)	4,312 (90.0)
Other investigation (%)	31 (8.6)	70 (3.7)	57 (4.7)	103 (13.0)	114 (32.8)	72 (46.1)	30 (60.0)	477 (9.9)

*The predominant recommendation was colposcopy investigation.

Table IX summarizes follow-up recommendations for patients with mild atypia and moderate or more severe atypia, based on the last smear of the year if the patient had more than one smear taken.

Compliance to Colposcopy Recommendations

The following figure presents age-specific compliance to colposcopy recommendations for patients with cervix/endocervix smears. Compliance is defined as having been achieved when a colposcopy examination was conducted within 1 week to 9 months of being recommended. Colposcopy examinations performed within one week of recommendation are not likely to be prompted by that recommendation.

Figure 3
Level of Compliance to Colposcopy Recommendation by Age Group
Patient's Last Cervical/Endocervical Smear in 2005

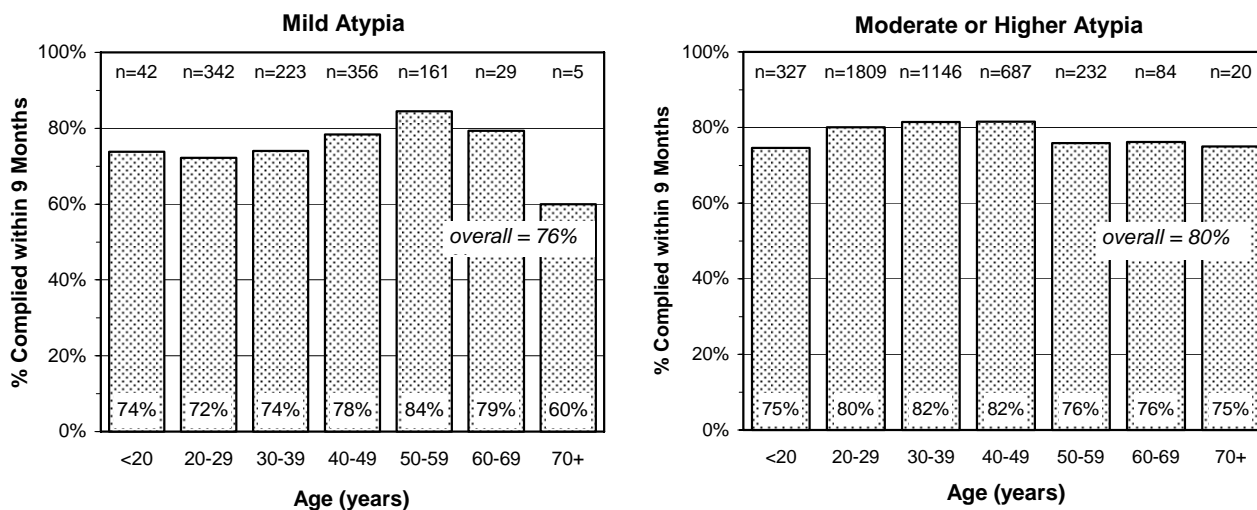


Figure 3 shows that the overall compliance to colposcopy recommendation for patients with findings of mild atypia and moderate or more severe atypia.

Positive Predictive Value of Cytology

The positive predictive value (PPV) of cytology was assessed by comparing significant cytology findings to histological diagnosis for patients with pathology specimens. Cytology findings were based on patient's last cervical/endocervical smear taken in 2004. Histological diagnosis was based on the most severe histological diagnosis from cervical pathology specimens taken up to one year after the Pap smear.

Table X below shows the number of patients with Pap smear finding of mild or higher squamous atypia and the PPV for patients with a histological diagnosis. Results are shown separately for patients with mild squamous atypia recommended to have a repeat smear, patients with mild squamous atypia recommended to have further investigation, and for patients with moderate or higher atypia.

Table X
Most Severe Histological Diagnosis within One Year of
Last Cervical/Endocervical Pap Smear of 2004

	Cytologic Finding					
	Mild Atypia				Moderate+ Atypia	
	Repeat Smear in 6 Months		Investigate			
	No.	%	No.	%	No.	%
Patients:	21,947	100.0	2,027	100.0	5,159	100.0
without pathology	20,585	93.8	724	35.7	733	14.2
with pathology	1,362	6.2	1,303	64.3	4,426	85.8
Positive Predictive Value <i>(patients with pathology):</i>						
CIN II or higher	347	25.5	204	15.7	2,579	58.3
CIN III or higher	140	10.3	67	5.1	1,515	34.2
Other Histology Finding:						
<i>Glandular</i>						
Severe	-	-	-	-	2	<0.1
In situ	4	0.3	3	0.2	10	0.2
Invasive	1	<0.1	2	0.2	52	1.2
<i>Other invasive</i>	-	-	-	-	-	-

The PPV of cytological diagnosis for CIN II or higher on histology is 58.3% for moderate or higher atypia, and 15.7% for mild atypia that were referred for further investigation. Majority of patients with mild atypia cytology results were recommended to repeat smear in 6 months (93.8%). Some of these patients would have further indication, e.g. subsequent smear, to warrant colposcopy or other investigation within one year (6.2%). The PPV of these cases are 25.5%.

Provincial Colposcopy Program

The Provincial Colposcopy Program was developed to act in a complimentary manner to the Provincial Cervical Cancer Screening Program (CCSP). This service currently consists of 24 hospital-based clinics located throughout the province. Their locations and the community gynecologists who staff them are listed in the Appendix.

The majority of all diagnostic colposcopic examinations in the province are performed through regional, hospital-based clinics. Individuals who are affiliated with the provincial colposcopy program essentially confine their colposcopic practices to the hospital-based clinics. All participating individuals are certified, and use a uniform reporting system with standardized terminology. Their results are incorporated into the CCSP database, and are summarized for the annual continuing medical education workshop in colposcopy, held by the Provincial Colposcopy Program.

In 2005, 12,472 colposcopy examinations were provided. The majority of colposcopies are initiated as a result of abnormal cytology (see Figure 4) and the primary site of investigation is mainly cervix (see Figure 5).

Figure 4
Reason for Referral to Colposcopy Clinic: 2005

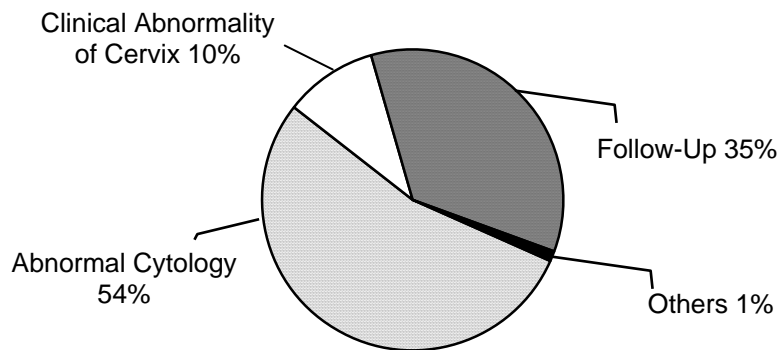
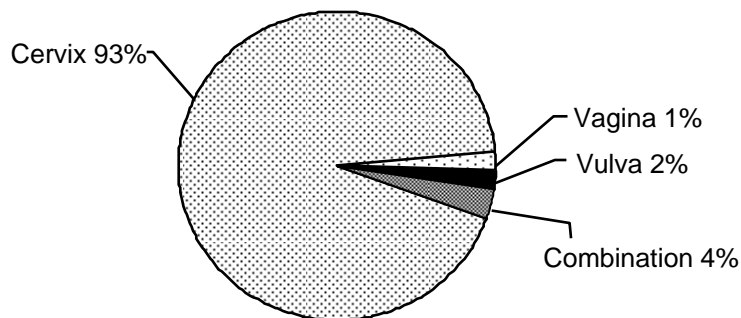


Figure 5
Site of Colposcopic Investigation: 2005



Results of all colposcopic examinations and suggested course of follow-up action are recorded on a standardized form. Copies of this form are sent to both the referring physician and to the CCSP for incorporation into the provincial database. This data collection process forms the basis of a provincial quality assurance program.

Cancer Statistics

New invasive cervical cancers diagnosed in 2002 to 2004 were identified from the British Columbia Cancer Registry and data collected by the CCSP. The cancer counts and incidence rates for 2002-2004 are presented in Table XI.

**Table XI
Invasive Cervical Cancers by Age Group**

		Age (Years)						Age 20+
		20-29	30-39	40-49	50-59	60-69	70+	
2004	Number of cases							
	All cell types	14	29	45	26	16	17	147
	Squamous cell only	11	25	28	20	13	11	108
	Incidence rate (<i>per 100,000</i>)							
	All cell types	5.0	9.5	12.7	9.1	8.9	7.2	9.0
	Squamous cell only	3.9	8.2	7.9	7.0	7.2	4.7	6.6
2003	Number of cases							
	All cell types	10	37	37	31	16	17	148
	Squamous cell only	7	27	26	16	11	11	98
	Incidence rate (<i>per 100,000</i>)							
	All cell types	3.6	11.7	10.5	11.2	9.2	7.3	9.1
	Squamous cell only	2.5	8.5	7.4	5.8	6.4	4.7	6.0
2002	Number of cases							
	All cell types	9	35	45	23	17	36	165
	Squamous cell only	6	26	31	16	15	27	121
	Incidence rate (<i>per 100,000</i>)							
	All cell types	3.3	10.8	13.0	8.7	10.1	15.7	10.3
	Squamous cell only	2.2	8.1	9.0	6.0	9.0	11.8	7.6

Notes:

1. Population estimates: BC STATS, BC Ministry of Finance and Corporate Relations
2. Population data was acquired through the Health Data Warehouse, BC Ministry of Health
3. Cancer data source: BC Cancer Registry and Cervical Cancer Screening Program of BC Cancer Agency

Invasive Squamous Carcinoma

Patient history review of invasive squamous cell carcinomas diagnosed in 2004 is summarized in Table XII. Patients who did not have a Pap smear within one to five years of being diagnosed with cervical cancer may have had their cancer prevented by screening. These patients fall into one of three categories. Never screened patients have no recorded CCSP Pap smears. Women last screened more than five years ago had discontinued screening. The Pap smear less than one year prior category comprises both women with cancer detected on first screen and women not screened within five years who had a Pap smear taken due to presenting with symptoms.

**Table XII
Screening History for Invasive Squamous Cell Cervical Cancer
Patients by Age Group: 2004**

	Age (years)						All Cancers
	20-29	30-39	40-49	50-59	60-69	70+	
No. of Invasive Squamous Cell Cancers	11	25	28	20	13	11	108
Never screened (%)	3 (27.3)	1 (4.0)	0	1 (5.0)	5 (38.5)	2 (18.2)	12 (11.1)
Last screened >5 years prior (%)	0	1 (4.0)	2 (7.1)	4 (20.0)	1 (7.7)	0	8 (7.4)
Pap smear <1 year prior (%) <i>(no screens in past 1-5 years)</i>	2 (18.2)	8 (32.0)	14 (50.0)	8 (40.0)	5 (38.5)	4 (36.4)	41 (38.0)
Screened 1-5 years prior (%)	6 (54.5)	15 (60.0)	12 (42.9)	7 (35.0)	2 (15.4)	5 (45.5)	47 (43.5)

Adenocarcinoma

Patient history review of invasive adenoarcinomas diagnosed in 2004 is summarized in Table XIII. Patients who did not have a Pap smear within one to five years of being diagnosed with cervical cancer fall into one of three categories. Never screened patients have no recorded CCSP Pap smears. Women last screened more than five years ago had discontinued screening. The Pap smear less than one year prior category comprises both women with cancer detected on first screen and women not screened within five years who had a Pap smear taken due to presenting with symptoms.

**Table XIII
Screening History for Invasive Adenocarcinoma Cervical Cancer
Patients by Age Group: 2004**

	Age (years)						All Cancers
	20-29	30-39	40-49	50-59	60-69	70+	
No. of Invasive Adenocarcinomas	2	3	17	5	3	5	35
Never screened (%)	1 (33.3)	2 (40.0)	3 (8.6)
Screened >5 years prior (%)	.	.	1 (5.9)	.	.	2 (40.0)	3 (8.6)
Pap smear <1 year prior (%)	.	.	2 (11.8)	.	2 (66.6)	1 (20.0)	5 (14.3)
Screened 1-5 years prior (%)	2 (100)	3 (100)	14 (82.4)	5 (100)	.	.	24 (68.6)

HUMAN PAPILLOMAVIRUS (HPV) AND CERVICAL CANCER

Cervical cancer screening based on cervical smears (Pap testing) is the most effective cancer screening method ever devised. However, because an individual Pap test has a low sensitivity, cervical cancer screening strategies have relied on repeated testing to ensure accuracy. This led British Columbia to establish an organized screening program to track adequate adherence to screening intervals and follow up of abnormalities.

The discovery that infection by certain subtypes of Human Papillomavirus (HPV) is a necessary cause of cervical cancer has important implications for cervical cancer prevention. Sensitive tests for these HPV types, called high risk HPV, are available. Furthermore, a recently licensed, quadrivalent HPV vaccine (Gardasil™) has been shown to be highly efficacious in preventing persistent infection by HPV types 16 and 18, two high risk HPV (HR-HPV) subtypes, responsible for 70% of all squamous carcinomas of the cervix. Established cervical cancer screening programs such as the Cervical Cancer Screening program of British Columbia (CCSP) need to rethink the current cervical cancer prevention strategy based on repeated Pap testing.

Published data on testing for HR-HPV have suggested that HR-HPV negative women have an extremely low risk to develop cervical cancer. The protective effect of a negative HR-HPV test appears to last for up to five years. This high negative predictive value of HR-HPV testing suggests that a test for HR HPV can replace the Pap test as the primary screening modality for cervical cancer. Because high risk HPV testing is less specific than the Pap test, a cost effective triage strategy is needed for women with a positive HR-HPV test. As the incidence of HPV infection decreases with age, the triage strategy may vary depending on the age of the woman tested. The CCSP has obtained research funding from the Canadian Institute of Health Research (CIHR) to evaluate primary HR-HPV testing in the prevention of cervical cancer. This evaluation will be in the form of a randomised controlled trial, set to commence in the middle of 2007.

The Canadian National Advisory Committee on Immunization (NACI) has issued a statement in February 2007 on HPV vaccination. It recommends Gardasil™ for females between 9 and 13 years of age, and advises females between ages 14 and 26 would benefit from Gardasil™. A provincial communicable disease policy committee will advise the province of British Columbia on the use of HPV vaccination in BC. HPV vaccination may have very important implications for cervical cancer prevention in general and for cervical cancer screening programs in particular. Meanwhile, it is important to emphasize that routine cervical cancer screening should continue after vaccination for the following reasons:

- Gardasil™ vaccine has been shown to be highly efficacious in preventing HPV-16 and 18 infections, which are responsible for about 70% of cervical cancer. Thus, vaccinated females will still be susceptible to other HR-HPV types.
- Women who were sexually active before vaccination, may have already been infected with HPV-16 or 18.

There is no question that the type and frequency of screening will change with more females vaccinated. This is an area that requires careful surveillance and research before screening guidelines can be changed.

The understanding that HPV is a necessary cause for the development of cervical cancer has greatly increased our understanding of the development and prevention of cervical cancer. With the advent of accurate HPV tests and efficacious HPV vaccines the strategies for cervical cancer prevention may have to be re-examined.

ACKNOWLEDGMENT

The Cervical Cancer Screening Program would like to thank its partners who have supported and contributed to the Program over the years.

The success of the Program depends on an integrated system of:

- Community health professionals taking the cervical smears (Pap smear slides)
- Dedicated and highly trained staff to process and read the slides
- Community facilities providing space and personnel to support regional colposcopy clinics
- Medical specialists to provide colposcopy follow-up and treatment

We would also like to thank the following organizations for their ongoing support:

- All hospitals participating in the Provincial Colposcopy Program
- BC Centre for Disease Control
- BC Medical Association
- BC Ministry of Health
- BC Women's Health Centre
- Canadian Cancer Society
- College of Physicians and Surgeons
- Provincial Health Services Authority
- Women's Health Bureau

CONTRIBUTORS

**Alphabetic listing*

Dr. Andrew J. Coldman	Leader, Population and Preventive Oncology
Dr. Dirk van Niekerk	Director, Cervical Cancer Screening Laboratory
Dr. Tom Ehlen	Director, Provincial Colposcopy Program
Ms. Jane Lo	Chief Cytotechnologist, CCSP
Ms. Laura Towers	Data Analyst, Surveillance and Outcomes Unit
Ms. Lisa Kan	Screening Operations Leader
Ms. Susan Chou	Secretary, Screening Programs
Ms. Veronika Moravan	Statistician, Surveillance and Outcomes Unit



PUBLICATIONS

1. **Hislop TG**, Taylor VM, Yasui Y, Tu S-P, Teh C, Jackson JC. An intervention to promote cervical cancer screening among Chinese women in North America. *Trends in Cancer Research 2006*; 2: 51-61.
2. Masoudi H, **Van Niekerk DJ**, Gilks CB, Cheang M, Bilek K, Fischer U, **Ehlen T**, Miller D, Horn LC. Loss of p16 INK4 expression in invasive squamous cell carcinoma of the uterine cervix is an adverse prognostic marker. *Histopathology. 2006 Nov*;49(5):542-5.
3. Lampinen TM, Latulippe L, **van Niekerk D**, Schilder AJ, Miller ML, Anema A, Hogg RS. Illustrated instructions for self-collection of anorectal swab specimens and their adequacy for cytological examination. *Sex Transm Dis. 2006 Jun*;33(6):386-8.
4. Rose J, Beaulac J, Howlett R, **Kan L**. Cervical Cancer Prevention and Control Network. Cervical cancer in Canada: a response to the release of the CCS/NCIC Cancer Statistics 2006. *J Obstet Gynaecol Can. 2006 Aug*;28(8):678-9.

SCREENING PROGRAM OVERVIEW

Definition of Screening

Primary prevention of cancer involves changes of behavior or habits that reduce a risk e.g. stop smoking, low fat diet etc. Screening for cancer is a secondary prevention strategy.

Secondary prevention can reduce cancer morbidity and mortality by diagnosing invasive disease at an earlier, more favorable prognostic stage and detecting precursor lesions associated with some cancers that once eliminated, prevent progression to invasive disease.

Screening is “the application of various tests to apparently healthy individuals to sort out those who probably have risk factors or are in the early stages of specified conditions.”¹

Limitations of Screening

The decision to screen an at-risk population for preclinical signs of cancer is based on well-established criteria related to the disease in question and the screening tests that re-used to identify individuals who may have occult disease.^{2,3,4} Although the overall objective of a screening program is to reduce morbidity and mortality from cancer, the goal of screening per se is the “application of a relatively simple, inexpensive test to a large number of persons in order to classify them as likely, or unlikely to have the cancer which is the object of the screen.” The emphasis on likelihood underscores the limits of what should be expected from screening (i.e screening tests are not diagnostic tests). A person with an abnormal screening test does not have a definitive diagnosis until additional, more sophisticated diagnostic tests are completed. The emphasis on likelihood also is important because screening tests are inherently limited in their accuracy, which varies by test, cancer site, and individual characteristics. Although most of screening interpretations are accurate, it is inevitable that some individuals are identified as possibly having cancer when they do not, and screening tests fail to identify some individuals who do have the disease.⁵ The comparative evaluation of accuracy versus error cannot be considered in absolute terms but rather should be evaluated in terms of the relative consequences on the other kind of error.

¹ Morrison A: Screening in Chronic Disease. New York, Oxford University Press. 1992.

² Cole P, Morrison AS: Basic issues in cancer screening. In Miller AB (ed); Screening in Cancer. Geneva, International Union Against Cancer, 1978, p7

³ Miller AB; Fundamentals of Screening. In Screening for Cancer. Orlando, Academic Press, 1985, p3

⁴ Wilson JMG, Junger G; Principles and Practice of Screening for Disease. Geneva, World Health Organization, 1968

⁵ Smith RA: Screening Fundamentals, Monogr Natl Cancer Inst 22:15, 1997

Organized Population Screening Program

To reduce morbidity and mortality from cancer in a population by screening, there must be coordinated and effective strategies to ensure acceptance and utilization of the established screening test. Since screening is targeted at asymptomatic women, the fine balance between maximizing benefits and minimizing undesirable effects must be maintained.

An organized approach to screening ensures that the target population has access to the screening service, and that it accepts and uses the services offered. This is achieved by including the following six program components:

1. Health Promotion
2. Professional Development/Education
3. Recruitment & Retention
4. Screening Test & Reporting
5. Follow-up
6. Evaluation/Research Partnerships

The success of screening is a shared responsibility of the team of individuals who work together to develop goals, set standards, monitor progress, and continue improvement in each of the six components.

Screening Program Administration

Population Oncology of the BC Cancer Agency (BCCA), under the auspices of the Provincial Health Services Authority (PHSA), focuses on early detection and prevention of cancer, and the development and provision of cancer information. Its areas of responsibilities include:

1. Cancer Control Research (Epidemiology)
2. Surveillance and Outcomes Unit (Data and Evaluation)
3. Cancer Information Centre (Libraries)
4. Hereditary Cancer Program
5. Provincial Cancer Screening Programs

The Division of Population Oncology is responsible for the administration of two population screening programs: the Cervical Cancer Screening Program (CCSP), and the Screening Mammography Program of BC (SMPBC). Data and Evaluation support for Screening Programs is provided by the Surveillance and Outcomes Unit.

CCSP SCREENING RECOMMENDATIONS

Criteria	Recommended Action
Onset of sexual activity or soon after	Start regular Pap smear screening
Negative or benign changes	Repeat smear in 12 months until there are 3 consecutive normal smears then continue at 24-month intervals
Mild atypia (dyskaryosis) squamous and/or glandular	Repeat in 6 months Colposcopy examination is recommended, if mild atypia persists for 2 years <i>*Recommendation for selected patient subgroup is under review</i>
Moderate or higher squamous or endocervical glandular atypia	Colposcopic examination is recommended
After age 69	Stop screening, if there are 3 or more normal smears in the last 10 years and no history of previous significant abnormality (moderate atypia or higher)
Pregnant Women	If no history of previous Pap smear, do Pap smear, otherwise follow guidelines as indicated in non-pregnant women
HIV Positive Women	Repeat smear in 6 months until there are 2 consecutive normal smears then continue at 12-month intervals

After Total Hysterectomy (uterus and cervix completely excised)

- ◆ Women with a history of moderate or higher abnormality (CIN II, CIN III or carcinoma *in situ* on histology), but no history of invasive cervical carcinoma should have three documented consecutive, technically satisfactory normal / negative vaginal smears one year apart over a 3-year period before discontinuing screening.
- ◆ Women with a history of invasive cervical carcinoma should follow the recommendation provided by the BC Cancer Agency Gynecological Tumor Group.
- ◆ Women with a history of *in utero* DES exposure should continue screening as long as this is clinically feasible.

After Sub-Total Hysterectomy (uterine corpus removed, cervix in place)

- ◆ Women who have had a subtotal hysterectomy should continue cervical cancer screening as per the Screening Program guidelines

COLPOSCOPY CLINIC LOCATIONS AND PERSONNEL STAFFING

ABBOTSFORD

MSA Hospital
2179 McCallum Road
Abbotsford, B.C.
604-853-2201
Dr. F. Ahman, Dr. M. Bakhet

COMOX

St. Joseph's General Hospital
2137 Comox Avenue
Comox, B.C. V9N 4B1
250-339-2242
Dr. D. Hartman, Dr. B.M. Bagdan

DUNCAN

Cowichan District Hospital
3045 Gibbins Road
Duncan, B.C. V9L 1E5
250-746-4141
Dr. S. Hancock

KAMLOOPS

Royal Inland Hospital
311 Columbia Street
Kamloops, B.C. V2C 2T1
250-374-5111
Dr. A. Human, Dr. V.S. Malliah

KELOWNA

Kelowna General Hospital
2268 Pandosy Street
Kelowna, B.C. V1Y 1T2
250-862-4000
Dr. P. Wilson, Dr. M. Jones

LANGLEY

Langley Memorial Hospital
22051 Fraser Highway
Langley, B.C. V3A 4H4
604-534-4121
Dr. E. Mah

MAPLE RIDGE

Ridge Meadows Hospital
Box 5000
11666 Laity Street
Maple Ridge, B.C. V2X 2B7
604-463-4111
Dr. W.H. Yeung

NANAIMO

Nanaimo Regional Hospital
1200 Dufferin Crescent
Nanaimo, B.C. V9S 2B7
250-754-2141
Dr. P. Mitchell, Dr. A. Hunt

NEW WESTMINSTER

Royal Columbian Hospital
330 East Columbia Street
New Westminister, B.C. V3L 3W7
604-520-4253
Dr. D.S. Allan, Dr. J.M. Turner, Dr. S. Pedersen

NORTH VANCOUVER

Lions Gate Hospital
230 East 13th Street
North Vancouver, B.C. V7L 2L7
604-988-3131
*Dr. V. Scali, Dr. E. Hoyer, Dr. R. Goodall,
Dr. J. Schouls*

PENTICTON

Penticton Regional Hospital
550 Carmi Avenue
Penticton, B.C. V2A 3G6
250-492-4000
Dr. J. Henniger

POWELL RIVER

Powell River Regional Hospital
5871 Arbutus Street
Powell River, B.C. V8A 4S3
604-485-3211
Dr. P. du Plessis

PRINCE RUPERT

Prince Rupert Regional Hospital
1305 Summit Avenue
Prince Rupert, B.C. V8J 2A6
250-624-2171
Dr. M. Pienaar

RICHMOND

Richmond General Hospital
7000 Westminister Highway
Richmond, B.C. V6X 4M1
604-278-9711
Dr. H. Mackoff, Dr. H. Robson

COLPOSCOPY CLINIC LOCATIONS AND PERSONNEL STAFFING – CONT

SECHELT

St. Mary's Hospital
P.O. Box 7777
Sechelt, B.C. V0N 3A0
250-885-2224
Dr. R. Kellett

SURREY

Surrey Memorial Hospital
13750 - 96th Avenue
Surrey, B.C. V3V 1Z2
604-581-2211
Dr. G. Doersam, Dr. P. Yeung

TERRACE

Mills Memorial Hospital
4720 Haughland Avenue
Terrace, B.C. V8G 2W7
250-635-2211
Dr. L. Almas

TRAIL

Trail Regional Hospital
1200 Hospital Bench
Trail, B.C. V1R 4M1
250-368-3311
Dr. M. Barclay, Dr. K. Hale

VANCOUVER

BCCA/VHHSC
855 West 12th Avenue
Vancouver, B.C. V5Z 1M9
604-875-4237
*Dr. T. Ehlen, Dr. D. Miller, Dr. M. Heywood
Dr. S. Finlayson, Dr. L. Sadownik*

VANCOUVER

St. Paul's Hospital
1081 Burrard Street
Vancouver, B.C. V6Z 1Y6
604-682-2344
Dr. G. Kinney, Dr. Elisabet Joa

VERNON

Vernon Jubilee Hospital
2101 - 32nd Street
Vernon, B.C. V1T 5L2
250-545-2211
Dr. C. Hatfield

VICTORIA

Royal Jubilee Hospital
1900 Fort Street
Victoria, B.C. V8R 1J8
250-595-9200
*Dr. E. McMurtrie, Dr. D. Quinlan
Dr. M. Rippington, Dr. H. Hunt*

WHITE ROCK

Peace Arch Memorial Hospital
15521 Russell Avenue
White Rock, B.C. V4B 2R4
604-531-5512
Dr. J. Christilaw, Dr. G. Jackson

WILLIAMS LAKE

Cariboo Memorial Hospital
517 North 6th Avenue
Williams Lake, B.C. V2G 2G8
250-392-4411
Dr. G. Gill, Dr. S. Raffard



EDUCATIONAL MATERIAL

The following is a list of educational materials relating to the Cervical Cancer Screening Program and/or Pap smear screening.

For General Audience

- Cervical cancer – protect yourself with regular pap tests (*Brochure – blue*)
- HPV & cervical cancer – what you should know, and do (*Brochure – pink*)
- Preventing cervical cancer (*Booklet-orange*)
- Abnormal pap smear – causes and proper follow-up (*Booklet-green*)

*Please note: Booklets are for a physician to use with a patient for further discussions.
(Limited distribution)*

For Smear Takers

- Laminated Card: Technique for Obtaining Cervical Smears
- DVD or Video: Speculum Exam and Pap Smear
- An Office Manual for Health Professionals – “Screening for Cancer of the Cervix”

For Cantonese & Mandarin Speaking Women

- Video motivating this ‘hard-to reach’ group to have regular Pap smears
- Slide series for health care providers to use with colleagues or the Cantonese/Mandarin public

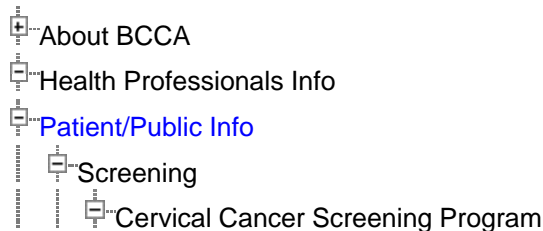
The material above was developed in collaboration with the Fred Hutchinson Cancer Research Centre in Seattle

Continuing Medical Education

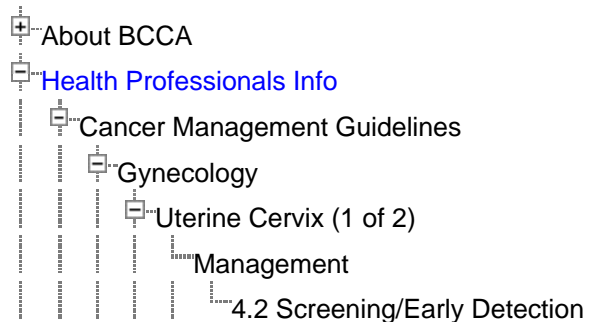
Continuing Medical Education (CME) rounds or workshops can be arranged for groups through the Cervical Cancer Screening Program by calling 604-877-6200.

Website: www.bccancer.bc.ca

Information for a general audience:



Information for smear takers:



REQUEST FOR EDUCATIONAL MATERIAL

Please call or fax this form to the CCSP to receive copies of the following free of charge:

Resources for a General Audience:

<u>Number of Copies</u>	<u>Description</u>
_____	Cervical cancer – protect yourself with regular pap tests (<i>Brochure-blue</i>) (also available on website at www.bccancer.bc.ca → Patient/Public Info → Screening → Cervical Cancer Screening Program)
_____	HPV & cervical cancer – what you should know, and do (<i>Brochure-pink</i>)
_____	Motivational message for Cantonese & Mandarin speaking women to attend for screening – <i>video</i> (available with or without subtitles – produced in 2001)

Resources for Medical or Other Professionals:

<u>Number of Copies</u>	<u>Description</u>
_____	Preventing cervical cancer (<i>Booklet-orange</i>)* - <i>Limited distribution</i>
_____	Abnormal pap smear – causes and proper follow-up (<i>Booklet-green</i>)* - <i>Limited distribution</i>
_____	* <i>Please note: Booklets are for a physician to use with a patient for further discussions.</i>
_____	Technique for Obtaining Cervical Smears - laminated card
_____	Speculum Exam & Pap Smears – DVD or video (produced in 2000)
_____	Screening for Cancer of the Cervix - Office Manual for Health Professionals**
	** available on website at: www.bccancer.bc.ca → HealthProfessionalsInfo → CancerManagementGuidelines → Gynecology → UterineCervix → Management → "Current B.C. Cancer Agency Colposcopy Program Guidelines"

Your name: _____

Your address: _____

Your MSC #: _____

Return this form to: Cervical Cancer Screening Program
8th Floor, 686 West Broadway
Vancouver, BC V5Z 1G1
Phone: 604-877-6200
Fax: 604-629-2510