BC Cancer Agency
CARE & RESEARCH

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CERVICAL CANCER SCREENING PROGRAM

2007 ANNUAL REPORT

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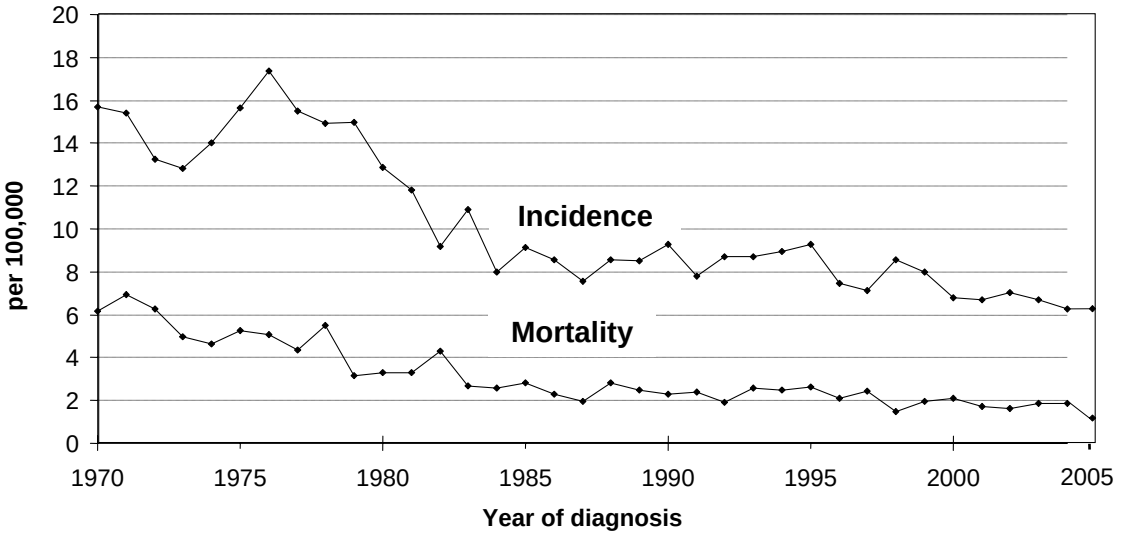
INTRODUCTION

Cervical cancer has declined by approximately 70% in British Columbia over the last 50 years, and continues in its slow decline over the last 10 years. This decline is attributed to the use of the Pap test which identifies pre-invasive lesions before they progress to cancer. Successful treatment of these lesions has brought about the reduction in the cancers seen. To be successful, Pap tests must be applied repeatedly throughout a woman's lifetime. Thus, the control of this disease is dependent upon the degree to which screening is utilized at the appropriate frequency by the eligible female population.

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



* Rates are standardized to the 1991 Canadian population

In 2006, 554,759 Pap tests were reported by the Cervical Cancer Screening Laboratory of the Provincial Health Services Authority, and the 3-year participation rate for women age 20-69 has dropped slightly to 73.3% after adjusting for hysterectomy. Several factors are anticipated to negatively affect the participation rate over the next five years:

- Analysis of participation rate by smaller age groups revealed that participation has been declining in the younger age group. As the population ages, this trend will likely affect the overall participation.
- Shortage of family physicians is expected to continue, thus limiting women's access for Pap test screening so that while family physicians will continue to provide the bulk of services, it is necessary to utilize other healthcare practitioners to encourage women to access screening
- Introduction of Human Papillomavirus (HPV) vaccination to the population is expected to affect perceived risk of disease and thus negatively affect the participation rate

A 5-year plan developed in 2007 proposes to enhance and target education and recruitment activities to maintain overall age 20-69 participation while increasing participation among women not currently having Pap tests. More specifically, this plan includes the following:

- Increase general awareness of cervical screening via media campaign
- Direct invitation and recall system to target non-participants in the population
- Targeted community projects, including "Pap Awareness Week" to provide education and access to hard-to-reach population, such as aboriginal women and new immigrants
- Physician-based promotion
- Web-based communication and registration for screening notifications to reach the younger, more mobile women

The year 2007 started with a series of radio and poster advertisements aimed at raising awareness of cervical cancer screening, chiefly among women aged 20 to 29 years of age. Feedback has been positive. Further promotion activities are being developed, starting with the addition of Anne McCulloch, who brings health promotion and education communication skills to the Program.

Technological development in cervical cancer screening is ongoing and in 2007, the Cervical Cancer Screening Laboratory assessed the ThinPrep® Pap Test liquid based cytology and ThinPrep® Imaging system from the Cytyc Corporation. The data collection is complete and the analysis is expected to be completed in early 2008.

The first patients will also be recruited into the Human papillomavirus testing for cervical cancer trial (HPV FOCAL) in December 2007. For further information the reader is directed to the HPV FOCAL website

www.bccancer.bc.ca/hpvfocal

PROGRAM RESULTS

Utilization

The Cervical Cancer Screening Program (CCSP) received a total of 554,759 gynecological smears from BC health care professionals in 2006. Health care professionals who submitted smears include gynecologists, general practitioners, midwives, naturopaths, nurses, etc. An additional 4998 smears were submitted from outside of BC, of which the majority (93%) originated in the Yukon Territory. The following program results include smears from British Columbia only.

Table I
Smears Received by Age Group: 2006

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Number of Smears	25,248	114,924	128,398	132,800	98,863	47,032	7,494	554,759
Smears from Cervix/Endocervix (%)	25,224 (99.9)	114,771 (99.8)	127,443 (99.2)	128,749 (96.9)	91,827 (92.8)	41,441 (88.1)	5,317 (70.9)	534,772 (96.3)
Smears from Other Sites (%)	24 (0.0)	153 (0.1)	955 (0.7)	4,051 (3.0)	7,036 (7.1)	5,591 (11.8)	2,177 (29.0)	19,987 (3.6)

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: 2006

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Number of Patients	23,630	106,954	120,381	127,607	95,729	45,660	7,135	527,096
With Smears from Cervix/Endocervix Site (%)	23,624 (99.9)	106,892 (99.9)	119,606 (99.3)	123,937 (97.1)	89,186 (93.1)	40,476 (88.6)	5,152 (72.2)	508,873 (96.5)
With Smears from non Cervix/Endocervix Site (%)	6 (0.0)	62 (0.0)	775 (0.6)	3,670 (2.8)	6,543 (6.8)	5,184 (11.3)	1,983 (27.7)	18,223 (3.4)

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: 2006

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Number of Patients	23,624	106,892	119,606	123,937	89,186	40,476	5,152	508,873
with 1 Smear (%)	22,364 (94.6)	99,418 (93.0)	111,871 (93.5)	119,204 (96.1)	86,520 (97.0)	39,491 (97.5)	4,976 (96.5)	483,844 (95.0)
with 2 Smears (%)	1,219 (5.1)	7,228 (6.7)	7,475 (6.2)	4,577 (3.6)	2,587 (2.9)	953 (2.3)	164 (3.1)	24,203 (4.7)
with 3+ Smears (%)	41 (0.1)	246 (0.2)	260 (0.2)	156 (0.1)	79 (0.0)	32 (0.0)	12 (0.2)	826 (0.1)
New Patients (%)	12,352 (52.2)	18,892 (17.6)	8,971 (7.5)	4,771 (3.8)	2,374 (2.6)	1,142 (2.8)	335 (6.5)	48,837 (9.5)

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 2004 - December 2006

	Age (years)							Age 20-69
	<20	20-29	30-39	40-49	50-59	60-69	70+	
British Columbia overall	8.5	63.5	70.8	63.5	52.1	39.7	5.0	59.4
Adjusted for Hysterectomy	8.5	63.5	76.9	80.4	77.7	64.0	7.7	73.3

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 2003 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.

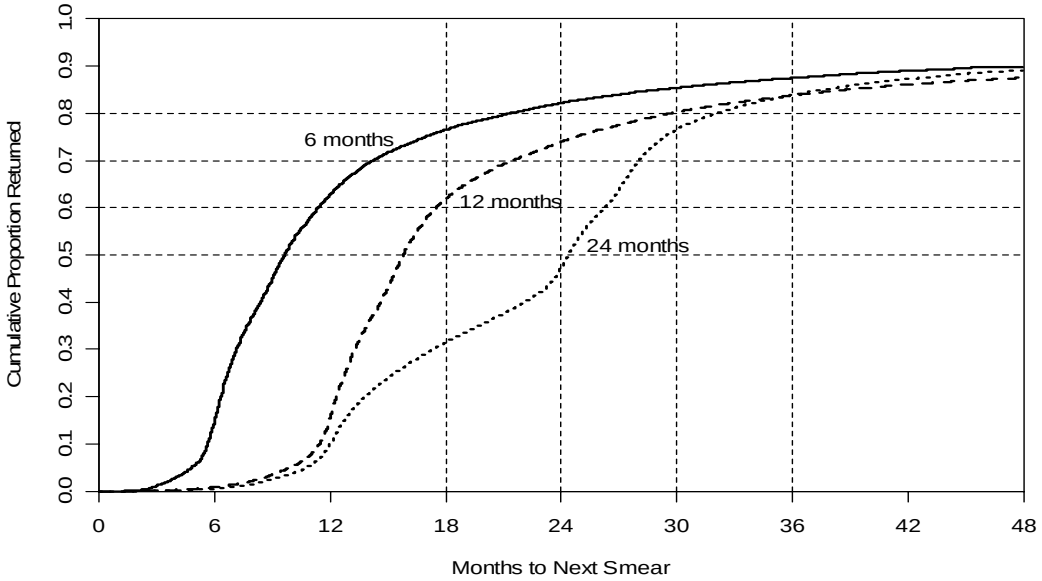
Patients with a cytological finding of moderate or higher atypia have a recommendation for further investigation. Thus, the rescreening rate was examined for patients with satisfactory smears and no finding of moderate or higher atypia.

Table V
Cumulative Numbers and Proportions Rescreened

Year of previous screen	2001	2002	2003
No. of patients	534,589	546,127	538,050
Rescreened			
by 18 months	54%	53%	52%
by 24 months	65%	65%	64%
by 30 months	76%	77%	77%
by 36 months	80%	81%	81%

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

Figure 2
Rescreening Rate for 2003 Patients by Recommended Interval



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: 2006

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Cervical/Endo cervical Smears	25,224	114,771	127,443	128,749	91,827	41,441	5,317	534,772
Unsatisfactory (%)	309	1,763	2,003	1,384	1,529	927	151	8,066
	(1.2)	(1.5)	(1.5)	(1.0)	(1.6)	(2.2)	(2.8)	(1.5)
Limited for Interpretation (%)	523	2,777	3,027	2,720	1,604	733	86	11,470
	(2.0)	(2.4)	(2.3)	(2.1)	(1.7)	(1.7)	(1.6)	(2.1)

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

The most commonly cited factor, for approximately 79% 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 exudates (14%). Multiple factors may be cited.

The most commonly cited factor for smears which are limited for interpretation is inflammatory exudates (47%), followed by scanty smear (41%).

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. Compared to the previous annual report the unsatisfactory rate has increased by 50%. This trend is unexplained but will be monitored.

Table VII
Distribution of Cytology Findings by Age Group Based on Patient's Last Cervical/Endocervical Smear in 2006

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Number of Patients	23,624	106,892	119,606	123,937	89,186	40,476	5,152	508,873
Unsatisfactory (%)	254	1,393	1,476	1,017	1,145	686	113	6,084
	(1.1)	(1.3)	(1.2)	(0.8)	(1.3)	(1.7)	(2.2)	(1.2)
Limited for interpretation (%)	407	2,200	2,484	2,266	1,368	662	62	9,449
	(1.7)	(2.1)	(2.1)	(1.8)	(1.5)	(1.6)	(1.2)	(1.9)
Negative* (%)	20,505	93,721	108,770	112,857	82,659	38,094	4,788	461,394
	(86.8)	(87.7)	(90.9)	(91.1)	(92.7)	(94.1)	(92.9)	(90.7)
"No endocervical cells "	5	39	65	126	17	.	.	252
Reactive changes (%)	479	2,140	2,186	2,962	1,741	471	90	10,069
	(2.0)	(2.0)	(1.8)	(2.4)	(2.0)	(1.2)	(1.7)	(2.0)
Mild atypia (%)	1,610	5,635	3,585	4,003	1,933	437	53	17,256
	(6.8)	(5.3)	(3.0)	(3.2)	(2.2)	(1.1)	(1.0)	(3.4)
*No previcous atypia** in past 2 yrs*	1,275	3,865	2,570	2,744	1,327	316	39	12,136
*Mild or higher atypia** in past 2 yrs*	335	1,770	1,015	1,259	606	121	14	5,120
Moderate or higher atypia (%)	364	1,764	1,040	706	323	126	46	4,369
	(1.5)	(1.7)	(0.9)	(0.6)	(0.4)	(0.3)	(0.9)	(0.9)
*No previous atypia** in past 2 yrs*	275	1,127	679	472	237	92	38	2,920
Mild atypia only in past 2 years	60	396	214	146	47	15	3	881
Moderate or higher atypia in past 2 years	29	241	147	88	39	19	5	568

* include "no endocervical cells"
** atypia – mild or higher atypia

Table VIII
Significant Atypia Rates (per 1000) by Age Group
Based on Patient's Last Cervical/Endocervical Smear in 2006

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Number of Patients	23,624	106,892	119,606	123,937	89,186	40,476	5,152	508,873
Squamous:								
Mild (ASC-US/LSIL)	67.4	50.5	26.0	25.2	16.2	8.2	6.4	29.5
Moderate+ (HSIL)	15.1	15.9	7.8	4.5	2.0	1.4	4.4	7.4
Atypical (of unspecified significance)	0.9	0.9	0.6	0.7	1.1	1.1	3.4	0.8
Glandular:								
Mild	0.6	1.7	3.5	6.7	5.0	2.4	3.1	3.9
Moderate (High grade)	0.0	0.1	0.2	0.6	0.9	0.7	1.7	0.4
Marked+ (High grade)	0.0	0.0	0.1	0.1	0.2	0.6	1.7	0.1
Epithelial:								
Mild (Low grade)	0.0	0.3	0.3	0.3	0.3	0.1	0.7	0.3
Moderate+ (High grade)	0.2	0.4	0.5	0.3	0.4	0.2	0.9	0.4

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 2006

	Age (years)							All Ages
	<20	20-29	30-39	40-49	50-59	60-69	70+	
Patients With Mild Atypia on Last Smear	1,610	5,635	3,585	4,003	1,933	437	53	17,256
Repeat in 6 months (%)	1,561	5,197	3,273	3,548	1,656	366	36	15,637
	(96.9)	(92.2)	(91.2)	(88.6)	(85.6)	(83.7)	(67.9)	(90.6)
Other investigation* (%)	49	438	312	455	277	71	17	1,619
	(3.0)	(7.7)	(8.7)	(11.3)	(14.3)	(16.2)	(32.0)	(9.3)
Patients with Moderate or Higher Atypia	364	1,764	1,040	706	323	126	46	4,369
Colposcopy and/or ECC (%)	344	1,699	999	618	223	71	22	3,976
	(94.5)	(96.3)	(96.0)	(87.5)	(69.0)	(56.3)	(47.8)	(91.0)
Other investigation (%)	20	65	41	88	100	55	24	393
	(5.4)	(3.6)	(3.9)	(12.4)	(30.9)	(43.6)	(52.1)	(8.9)

*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 2006

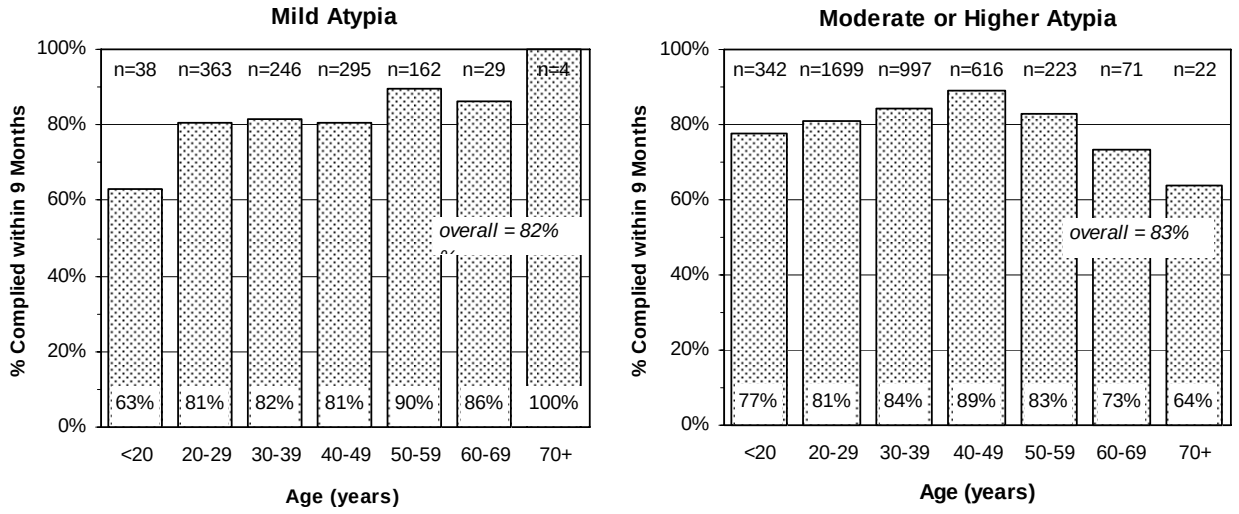


Figure 3 shows that the overall compliance to colposcopy recommendation for patients with findings of mild atypia and moderate or more severe atypia.

Positive Predictive Value of Cytology

The positive predictive value (PPV) of cytology is assessed for positive Pap tests that have had confirmational investigation, such as coloposcopy and/or pathology reported within one week to one year after the Pap test. Surveillance with repeat Pap tests only is not regarded as confirmational investigation. This measure is an indicator of the predictive validity of positive Pap test. However, it is important to note the limitations of cytology and histology, such as specimen sampling may not be representative of the lesion, and interpretation is subject to observer variation for cytology, and to lesser extent for histology. Furthermore, there may be progression or regression of the lesion in the period between cytology and histology, particularly with mildly abnormal lesions. Histological diagnosis was based on the most severe histological diagnosis from cervical pathology reported up to one year after the Pap test. Cervical intraepithelial neoplasia (CIN) result reporting terminology is used.

Table X below shows the number of Pap tests with finding of mild or higher squamous atypia that are recommended for investigation, and the PPV of cytology for positive Pap tests with confirmational investigation. Results are shown separately for smears with mild squamous atypia recommended to have further investigation, and for smears with moderate or higher atypia.

Table X -
Positive Predictive Value of Cytology: 2005

	Significant Cytology Finding			
	Mild Atypia*		Moderate+ Atypia	
	No.	%	No.	%
Smears:	2,135	100.0	5,735	100.0
without confirmational investigation	675	31.6	862	15.0
with confirmational investigation**	1,460	68.4	4,873	85.0
Positive Predictive Value*:*				
CIN II or higher	151	10.3	2000	41.0
CIN III or higher	37	2.5	1095	22.5
Other Histology Finding:				
Glandular				
Severe	-	-	-	-
In situ	2	0.1	16	0.3
Invasive	1	0.1	26	0.5
Other invasive	-	-	1	< 0.1

* with recommendation for coloposcopy investigation.
** do not include investigation where there are only repeated pap smears

The PPV for CIN II or higher on histology is 41.0% for moderate or higher atypia, and 10.3% for mild atypia that were referred for further investigation. Majority of Pap tests with mild atypia cytology results were recommended to repeat smear in 6 months (92.9%). Some of these smears would have further indication, such as subsequent significant Pap test result, to warrant colposcopy or other investigation within one year (7.9%).

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 Colposcopy Clinic Locations and Personnel Staffing.

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 2006, 12,638 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 the cervix (see Figure 5).

Figure 4
Reason for Referral to Colposcopy Clinic: 2006

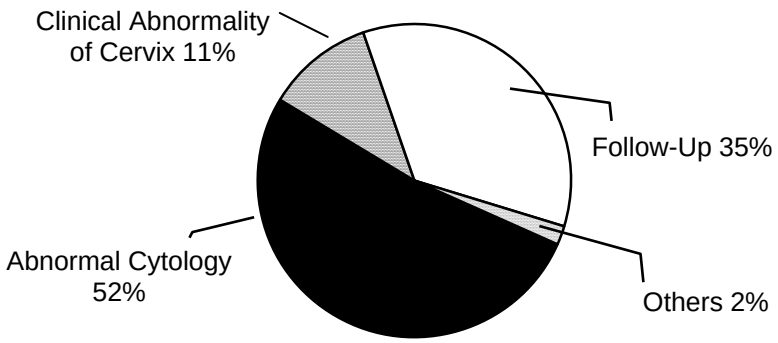
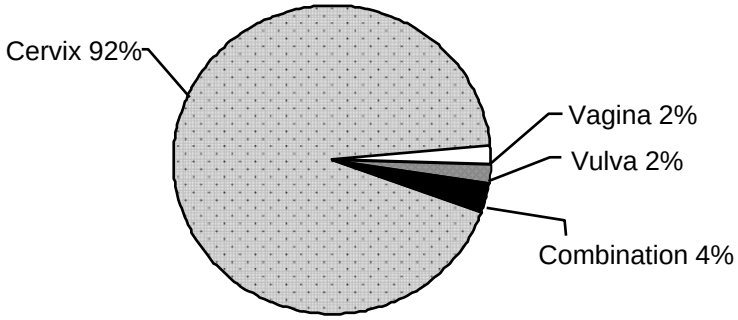


Figure 5
Site of Colposcopic Investigation: 2006



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.

In 2007, the British Columbia Cancer Agency Colposcopy Program initiated the process of linking all provincial colposcopy clinics through a centralized colposcopy database. This project will facilitate communication between colposcopists, quality insurance and research and will be a world first: through the centralized Pap Smear screening and now also colposcopy diagnostics, women in British Columbia will have state of the art cervical cancer prevention available to them. The introduction next year of HPV vaccination will complete the plan of moving towards an elimination of cervical cancer in the future.

Cancer Statistics

New invasive cervical cancers diagnosed in 2003 to 2005 were identified from the British Columbia Cancer Registry and data collected by the CCSP. The cancer counts and incidence rates for 2003-2005 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+	
2005	Number of cases							
	All cell types	9	38	37	35	17	13	149
	Squamous cell only	8	26	19	23	13	8	97
	Incidence rate *(per 100,000)*							
	All cell types	*3.1*	*12.5*	*10.4*	*11.7*	*9.1*	*5.4*	*8.9*
	Squamous cell only	*2.8*	*8.5*	*5.3*	*7.7*	*7.0*	*3.4*	*5.8*
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 *(per 100,000)*							
	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 *(per 100,000)*							
	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*

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 2005 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 the following three categories: 1) Never screened patients have no recorded CCSP Pap smears, 2) Women last screened more than five years ago had discontinued screening, 3) 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: 2005

	Age (years)						All Cancers
	20-29	30-39	40-49	50-59	60-69	70+	
No. of Invasive Squamous Cell Cancers	8	26	19	23	13	8	97
Never screened (%)	-	-	-	5	1	6	12
	-	-	-	21.7	7.7	75.0	12.4
Last screened >5 years prior (%)	-	1	-	3	3	2	9
	-	3.8	-	13.0	23.1	25.0	9.3
Pap smear <1 year prior (%)	1	14	8	8	9	-	40
(no screens in past 1-5 years)	12.5	53.8	42.1	34.8	69.2	-	41.2
<5 years prior (%)	7	11	11	7	-	-	36
	87.5	42.3	57.9	30.4	-	-	37.1

Adenocarcinoma

Patient history review of invasive adenoarcinomas diagnosed in 2005 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 the following three categories: 1) Never screened patients have no recorded CCSP Pap smears, 2) Women last screened more than five years ago had discontinued screening, 3) 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: 2005

	Age (years)						All Cancers
	20-29	30-39	40-49	50-59	60-69	70+	
No. of Invasive Adenocarcinomas	1	11	18	11	2	4	47
Never screened (%)	-	-	-	-	1	-	1
	-	-	-	-	50.0	-	2.1
Screened >5 years prior (%)	-	-	-	-	-	2	2
	-	-	-	-	-	50	4.3
Pap smear <1 year prior (%)	-	-	6	3	-	-	9
(no screens in past 1-5 years)	-	-	33.3	27.3	-	-	19.1
<5 years prior (%)	1	11	12	8	1	2	35
	100.0	100.0	66.7	72.7	50.0	50.0	74.5

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

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PUBLICATIONS & PRESENTATIONS

Publications:

Shadeo A, Chari R, Vatcher G, Campbell J, Lonergan KM, Matisic J, **van Niekerk D**, **Ehlen T**, Miller D, Follen M, Lam WL, MacAulay C. (2007). Comprehensive serial analysis of gene expression of the cervical transcriptome. *BMC genomics,* 8, 142.

Van Niekerk, D, Guillaud, M, Matisic, J, Benedet, JL, Freeberg, JA, Follen, M, MacAulay C. (2007). p16 and MIB1 improve the sensitivity and specificity of the diagnosis of high grade squamous intraepithelial lesions: Methodological issues in a report of 447 biopsies with consensus diagnosis and HPV HCII testing. *Gynecologic oncology, 107*(1 Suppl 1), S233-40.

Hislop TG, Bajdik CD, Saroa SR, Yeole BB, Barroetavena MC. Cancer Incidence in Indians from three areas: Delhi and Mumbai, India and British Columbia, Canada. *Journal of Immigrant and Minority Health 2007*; 9: 221-227.

Ogilvie G, Krajden M, Maginley J, Isaac Renton J, **Hislop G**, Elwood-Martin R, Sherlock C, Taylor D, Rekart M. Feasibility of self-collection of specimens for human papillomavirus testing in hard-to-reach women. *Canadian Medical Association Journal 2007*; 177: 480-483.

Hislop TG, Bajdik CD, Regier MD, Barroetavena MC. Ethnic differences in survival for female cancers of the breast, cervix and colorectum in British Columbia, Canada. *Asian Pacific Journal of Cancer Prevention 2007*; 8: 209-214.

Thompson B, Thompson LA, Chan NL, **Hislop TG**, Taylor VM. Cost-effectiveness of cervical cancer screening among Chinese women in North America. *Asian Pacific Journal of Cancer Prevention 2007*; 8: 287-293.

Presentations:

Coldman A. *BCCSP and the Impact of HPV: The Future of Vaccination and HPV Testing for Cervical Cancer Prevention.* HPV Focal Study – Presentation November 22, 2007.

Coldman A. *A Screening Trial of HPV Testing in British Columbia*. HPV Focal Study – Presentation October 18, 2007.

Coldman A, Smith L. *HPV Focal Study and the Family Practitioner Collaborator*. HPV Focal Study – Presentation September 18, 2007.

Coldman A, Martin R, Smith L. *HPV Focal Study and the Family Practitioner Collaborator*. HPV Focal Study – Presentation June 27, 2007.

Van Niekerk D, Ogilvie G, Krajden M, Martin R, **Ehlen T**, Stuart G, Peacock S, Franco E, **Coldman A**. *A Randomised controlled trial of HPV Testing for Cervical Cancer Screening*. HPV Focal Study – Presentation June 19, 2007.

Coldman A. *The Future of the BC Cervical Cancer Screening Program: Current research and future goals.* HPV Focal Study – Presentation May 29, 2007.

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

The following Cancer Screening Programs are organized under the Population Oncology portfolio of the BC Cancer Agency:

- Cervical Cancer Screening Program (CCSP)
- Screening Mammography Program (SMP)
- Hereditary Cancer Screening Program (HCP)

These Provincial screening programs share some common functions and staff, and also have somewhat separate elements reflecting the different medical disciplines and stakeholders involved. Screening policies are established through scientific evidence reviews by the BC Cancer Agency Tumour Groups composed of cancer specialists, clinicians and researchers around the province.

In addition to these programs, the Population Oncology portfolio includes an epidemiology group (Cancer Control Research) and a cancer surveillance unit (Surveillance and Outcomes Unit). The population screening programs share key staff in order to improve operation efficiency and make the best use of the knowledge base of the programs.

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 dyskaryosis (squamous and/or glandular)	Repeat in 6 months Colposcopy examination is recommended, if mild atypia persists for 2 years
Moderate or higher dyskaryosis	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

POST-HYSTERECTOMY SCREENING GUIDELINES

I. After Total Hysterectomy (uterus and cervix completely excised)

- Women with no history of moderate or higher abnormality and benign hysterectomy pathology can discontinue screening.
- If no previous pap smear record is available and hysterectomy pathology is benign, the patient should have two consecutive negative smears one year apart before discontinuing screening.
- 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.

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

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

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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

- Technique for obtaining cervical smears *(laminated card)*
- Speculum Exam and Pap Smear (*DVD)*
- Screening for Cancer of the Cervix: An Office Manual for Health Professionals

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:

- About BCCA
- Patient/Public Info
  - Screening
    - Cervical Cancer Screening Program

Information for smear takers:

- About BCCA
- Health Professionals Info
  - Cancer Management Guidelines
    - Gynecology
      - Uterine Cervix (1 of 2)
        - 4.2 Screening/Early Detection

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:

Number of Copies	Description
_____	Cervical cancer – protect yourself with regular pap tests (brochure - blue)*
_____	HPV & cervical cancer – what you should know, and do (brochure - pink)*
_____	Motivational message for Cantonese & Mandarin speaking women to attend for screening (video)

* available on website: www.bccancer.bc.ca→Patient/Public Info→Screening→Cervical Cancer Screening Program(CCSP) →Publications

Resources for Medical or Other Professionals:

Number of Copies	Description
_____	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.*
_____	Technique for Obtaining Cervical Smears (laminated card)
_____	Speculum Exam & Pap Smears (DVD)
_____	Screening for Cancer of the Cervix – Office Manual for Health Professionals**

** available on website at: www.bccancer.bc.ca → HealthProfessionalsInfo → CancerManagementGuidelines → Gynecology → UterineCervix → Screening/Early Detection

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

GLOSSARY

Age-Standardized Incidence Rate
Incidence rate is the proportion of women in the population who develop cervical cancer in a given year, expressed as the number of deaths per 100,000 people. Age-standardized incidence rate is the weighted average of the age-range specific incidence rates, where the weights are the proportions of people in the corresponding age groups of the 1991 Canadian population.

$$Age\text{-}Standardized\ Incidence\ Rate = \sum_i \left(\frac{Ca_i}{pop_i} \times weight_i \times 100{,}000 \right)$$

Where Ca_i is the number of cervical cancer detected in a given year for age group *i*, pop_i is the BC female population in a given year for age group *i*, and $weight_i$ is the proportion of people in age group *i* of the 1991 Canadian population.

Age-Standardized Mortality Rate
Mortality rate is the proportion of women in the population who died of cervical cancer in a given year, expressed as the number of deaths per 100,000 people at risk. Age-standardized mortality rate is the weighted average of the age-range specific mortality rates, where the weights are the proportions of people in the corresponding age groups of the 1991 Canadian population.

$$Age\text{-}Standardized\ Mortality\ Rate = \sum_i \left(\frac{Deaths_i}{pop_i} \times weight_i \times 100{,}000 \right)$$

Where $Deaths_i$ is the number of cervical cancer deaths in a given year for age group *i*, pop_i is the BC female population in a given year for age group *i*, and $weight_i$ is the proportion of people in age group *i* of the 1991 Canadian population.

Participation Rate
BC Overall
Proportion of women in the BC female population had a Pap smear taken from the cervix and/or endocervix at least once over a 30-month period.

BC Adjusted for Hysterectomy
Proportion of women out of the BC female population without hysterectomy had a Pap smear taken from the cervix and/or endocervix at least once over a 30-month period. The BC female population without hysterectomy is computed using the hysterectomy rates estimated from a population sample of an epidemiological study conducted in 1995.

Positive Predictive Value

Proportion of smears with significant cytology and have histological confirmation of cervical abnormality out of those smears with significant cytology and had follow-up investigation. Surveillance with repeat Pap smears only are not regarded as follow-up investigation.

$$PPV = \frac{number\ of\ \ smears\ with\ significant\ \ pathology\ and\ cytology\ \ findings}{number\ of\ \ smears\ with\ significant\ cytology\ \ findings\ that\ were\ investigated}$$

Rescreening Rate

Proportion of women returned for Pap test.

$$Retention\ Rate = \frac{Number\ of\ \ women\ returned\ \ for\ \ Pap\ test}{Number\ of\ \ women\ expected\ to\ return\ \ for\ \ Pap\ test}$$