

=Abstract=

## ASCUS, AGUS and Benign Endometrial Cells in Cervicovaginal Smears: Histologic Correlations and Clinical Significance

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**Objective:** The purpose of this study is to evaluate the histologic correlations and the clinical significance among patients with atypical squamous cells of undetermined significance (ASCUS), atypical glandular cells of undetermined significance (AGUS) and benign endometrial cells identified on cervical Pap smear screening.

**Materials & Methods:** The computerized files of the Department of Pathology at Samsung Cheil Hospital were searched from 1991 to 1997 to evaluate the annual statistics of cytologic diagnoses including normal/benign, ASCUS, AGUS, low-grade squamous intraepithelial lesion (LSIL), high-grade squamous intraepithelial lesion (HSIL) and cancer classified by the Bethesda System (TBS). Cytohistologic correlations on follow-up were separately analysed in ASCUS (190 cases), AGUS (268 cases) and benign endometrial cells (169 cases), respectively. Additionally, post-menopausal squamous atypia (83 cases) were also included in this study. TBS terminology was used in both cytologic and histologic diagnoses.

**Results:** During 7-year period (1991-1997), 447,049 cervicovaginal smears were evaluated. The median rate of abnormal cytology was 4.4%, with 2.1% of ASCUS, 2.06% of squamous intraepithelial lesion (SIL), and 0.08% of AGUS. The median ratio of ASCUS versus SIL was 1.24. Specimen adequacy was evaluated on 47,525 cases, of which categories of "satisfactory for evaluation but limited by" and "unsatisfactory for evaluation" were 28.3% and 0.03%, respectively. Follow-up of 190 patients with ASCUS cytology showed 30% (57 cases) with SIL on biopsy; 18% (35 cases) with LSIL, 11% (21 cases) with HSIL, and 1% (1 case) with microinvasive squamous cell carcinoma. On histologic examination, 77% (37/48 cases) with ASCUS favoring SIL

revealed SIL in contrast to 14%(20/142cases) with ASCUS favoring reactive change, which is statistically significant.(Chi-Square test, P<0.0001). Of 83 cases of post-menopausal squamous atypia(PSA), smears with LSIL showed 34.9%(15/43cases) with LSIL on biopsy. 268 patients with AGUS smears had 25%(67cases) with clinically significant cervical or endometrial lesions on histologic examinations. Among 17.9%(48cases) with cervical lesions, squamous abnormalities were 10.5%(28cases); including 1.5%(4cases) with LSIL and 9.0%(24cases) with HSIL. Glandular lesions in cervix were 7.5%(20cases); 3.0%(8cases) of glandular atypia or dysplasia, 1.9%(5cases) of adenocarcinoma in situ, 1.1%(3cases) of microinvasive adenocarcinoma and 1.5%(4cases) of adenocarcinoma. Of 7.1%(19cases) of endometrial lesions, 2.2%(6cases) was endometrial hyperplasia, 4.1%(11cases) endometrial carcinoma, 0.4%(1case) MMT and 0.4%(1case) metastatic adenocarcinoma from stomach were verified. The pathologies of 169 cases with benign endometrial cells shed in cervicovaginal smears were confirmed to be endometrial polyp(8.3%), endometrial hyperplasia(4.1%) and endometrial carcinoma(5.9%).

**Conclusion:** The results of this study indicates that clinicians should communicate with pathologists for proper management of abnormal cytology. Further evaluation and decision of management should be made based on input from pathologists as well as on clinical setting and professional guidelines.

*Keywords:* ASCUS, AGUS, Benign endometrial cells, Postmenopausal squamous atypia(PSA), Cervicovaginal smear, Histologic correlation, Specimen adequacy, The Bethesda System(TBS)

Pap smear (specimen adequacy) , ASCUS (Atypical Squamous Cells of Undetermined Significance) 가 , HPV ( , low grade squamous intraepithelial lesion, LSIL) CIN II가 ( , high grade squamous intraepithelial lesion, HSIL) , AGUS(Atypical Glandular Cells of Undetermined Significance)

.4) TBS 1988 1991 . 1991 TBS 1997 .5) TBS TBS TBS 가 ASCUS AGUS

(cytological correlation)

TBS가

ASCUS LSIL

(benign endometrial cell)

CervexBrush®

95%

IAC

1

7

Path AutoPap 300 QC System®

TBS

file system (AS 400 Host System)

1. (Specimen adequacy)

1997 5 1997 12

47,525

TBS (satisfactory for evaluation), (satisfactory for evaluation but limited by) (unsatisfactory for evaluation)

가

2.

1991 1 1997 12 447,049

TBS

1990 1991 6

TBS terminology

(within normal limits), (benign cellular change, BCC), (benign endometrial cell)

Normal/Benign

cancer

ASCUS (Ratio of ASCUS-SIL)

1990 1991 6 TBS

ASCUS IIb

ASCUS ASCUS-SIL

1991 1997

LSIL HSIL ASCUS

ASCUS 1991 TBS

HPV

(immature atypical metaplastic cell), (atrophic cellular atypia) (atypical parakeratosis) (atypical repair cell) ASCUS

AGUS

ASCUS SIL

AGUS

TBS

가 가

(tubal metaplasia), (microglandular hyperplasia)

/

(adenocarcinoma in situ) (adenocarcinoma)

3. (Cytohistological correlation) , 가

TBS .8-12) 가 TBS AGUS

CIN I (mild dysplasia) , CIN II CIN III (moderate dysplasia) , AGUS

(severe dysplasia) (carcinoma in situ) .

1996 1 1996 12

(cytohistologic correlation) . 415

ASCUS TBS 169

ASCUS LSIL HSIL 가 7,14

1993 5 1994 12 가

ASCUS 190 , LSIL Z-sampler<sup>®</sup> Pipelle<sup>®</sup>

120 , HSIL 112 422 가

ASCUS 가

LSIL HSIL 가

HPV-DNA (recommendation) 1. 1997 5 1997 12 47,525

TBS 가

(Post-menopausal squamous atypia, PSA) 28.3% 71.7%, 0.03% 가

1995 1 1996 12 ASCUS 가 (20.5%)

LSIL 50 (7.58%)

Jovanovic 13) koilocytotic atypia PSA criteria . (poor fixation) (obscuring factor)

가 83 . 0.22%

HSIL 16 (0.03%)

ASCUS 8 , LSIL 가

ASCUS 32 LSIL 43 가 (scanty cellularity) (Table 1).

AGUS

1991 5 1996 12 AGUS 2.

326 1991 1 1997 12 447,049

가 268 TBS

(ASCUS, AGUS, LSIL, HSIL & cancer) 3.93%  
 5.07% 4.4%  
 1995  
 1994 SIL  
 ASCUS  
 가 (Table 2, 3)

2.1% TBS 1991 1992  
 1.24% 1.25% TBS 1990  
 1993 2  
 가 2.14% 2.88%  
 1993  
 (Table 2). LSIL HSIL SIL  
 가 가  
 1991 1992 1993

Table 1. Frequency distribution of adequacy categories

Categories	No.	%
Satisfactory for evaluation	34085	71.72
SBLB*	13424	28.25
due to		
drying artifact	6	0.01
obscuring inflammation	71	0.15
cytolysis	2	0.01
no EC**	3603	7.58
insufficient clinical information	9742	20.49
Unsatisfactory for evaluation	16	0.03
Total	47525	100

SIL  
 1991 1992 2.07% 2.12%  
 1993 1.94% 1.25%  
 ASCUS/SIL ratio TBS  
 1991 1992 0.6 1993  
 1.1 2.0 1.2 SIL  
 ASCUS가 가  
 1992 NCI workshop17) 2 3  
 (Table 3).  
 AGUS  
 ASCUS가 2.1% AGUS  
 0.07 0.10% 0.08%  
 AGUS ASCUS 26  
 ASCUS 가  
 (Table 2).

SBLB\*: Satisfactory for evaluation but limited by  
 EC\*\*: Endocervical component

ASCUS ASCUS-SIL (Ratio of  
 ASCUS-SIL)  
 ASCUS 1.24% 2.88%

3. (Cytohistological corre-  
 lation)  
 ASCUS

Table 2. Annual statistics of cervicovaginal cytologic diagnoses pre-Bethesda(1990) and post-Bethesda(1991-1997)

	1990. 6 12		1991		1992		1993		1994		1995		1996		1997	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Normal	26363	96.45%	48984	96.07%	53874	96.07%	58518	95.40%	62846	95.46%	63997	94.93%	67374	95.75%	71927	95.87%
/Benign																
ASCUS	311	1.14%	631	1.24%	700	1.25%	1337	2.18%	1410	2.14%	1944	2.88%	1661	2.36%	1892	2.52%
AGUS			43	0.08%	53	0.09%	43	0.07%	53	0.08%	69	0.10%	53	0.08%	68	0.09%
LSIL	194	0.71%	507	0.99%	546	0.97%	509	0.83%	572	0.87%	480	0.71%	431	0.61%	383	0.51%
HSIL	341	1.25%	551	1.08%	645	1.15%	601	0.98%	702	1.07%	665	0.99%	666	0.95%	555	0.74%
Cancer	125	0.46%	273	0.54%	260	0.46%	329	0.54%	255	0.39%	261	0.39%	183	0.26%	198	0.26%
Total	27334	100%	50989	100%	56078	100%	61337	100%	65838	100%	67416	100%	70368	100%	75023	100%

Table 3. Ratio of ASCUS-SIL (ASCUS/SIL)

	1990. 6	12	1991	1992	1993	1994	1995	1996	1997
Annual Pap volume (No.)	27,334		50,989	56,078	61,337	65,838	67,416	70,368	75,023
Abnormal Pap (%)	3.55		3.93	3.93	4.6	4.54	5.07	4.25	4.13
ASCUS(%)	1.14		1.24	1.25	2.18	2.14	2.88	2.36	2.52
SIL(%)	1.96		2.07	2.12	1.81	1.94	1.70	1.56	1.25
ASCUS/SIL	0.6		0.6	0.6	1.2	1.1	1.7	1.5	2.0

1993 5 1994 12

(Chi-Square test, P < 0.0001)

가  
 ASCUS 190 57 (30%)  
 35 (18%), 21 (11%)  
 1 (1%)

(Table 4).

Table 4. Rate of SIL on biopsy

Cytology	Histology			Total
	LSIL*	HSIL**	SCC***	
ASCUS (n=190)	35(18%)	21(11%)	1(1%)	57(30%)
LSIL (n=120)	67(56%)	2(2%)	0(0%)	69(58%)
HSIL (n=112)	2(2%)	103(92%)	2(2%)	107(96%)

\* LSIL: Flat condyloma & CIN I  
 \*\* HSIL: CIN II & III  
 \*\*\* SCC: Squamous cell carcinoma

ASCUS 190  
 142 (75%)  
 48 (25%)  
 ASCUS 142  
 20 (14%)  
 48 37 (77%)  
 ASCUS

SIL

(Table 5).

Table 5. ASCUS-RC vs ASCUS-SIL in rate of SIL on biopsy

Cytology	Histology (SIL-positive)	
	No.	%
ASCUS favoring RC* (n=142)	20	14a
ASCUS favoring SIL**(n=48)	37	77b

\* RC: Reactive change

\*\* SIL: Squamous intraepithelial lesion

a vs b Chi-Square test, P < 0.0001

LSIL 58% HSIL 96%  
 LSIL ASCUS  
 HSIL (Table 4). ASCUS  
 LSIL, HSIL  
 LSIL HSIL  
 LSIL HSIL 58% 56% 96%  
 92%  
 Jovanovic PSA criteria  
 ASCUS 8, LSIL ASCUS  
 32, LSIL 43 가  
 ASCUS 8 2 (25%), ASCUS,  
 R/O LSIL 32 5 (15.6%) LSIL 43  
 15 (34.9%) LSIL

(Table 6).

Table 6. Cytohistologic correlation of postmenopausal squamous atypia (PSA)

Cytology	Histology (LSIL-positive)	
	No.	%
ASCUS (n=8)	2	25
ASCUS R/O LSIL (n=32)	5	15.6
LSIL (n=43)	15	34.9

AGUS  
 1991 5 1996 12 AGUS  
 326  
 가 268  
 (17.9%)  
 67 (25%)  
 (Table 7).  
 LSIL 4 (1.5%), HSIL

Table 7. Histologic diagnoses in AGUS Paps on follow-up

	Histology	No.	%
Cervix (n=48)	Squamous lesions		
	LSIL	4	1.5
	HSIL	24	9.0
	Glandular lesions		
	Glandular atypia/dysplasia	8	3.0
	Adenocarcinoma in situ	5	1.9
	Microinvasive adeno ca.	3	1.1
Endometrium (n=19)	Adenocarcinoma	4	1.5
	Hyperplasia	6	2.2
	Adenocarcinoma	11	4.1
	MMMT*	1	0.4
	Metastatic adeno ca.	1	0.4
Total		67/268	25

MMMT\*: Mixed Müllerian mesodermal tumor

24 (9.0%) 28 (10.5%)  
 atypia (glandular  
 (3.0%), (glandular dysplasia) 8  
 (1.1%) 5 (1.9%), 3  
 4 (1.5%)  
 7.5% AGUS  
 54 (20.1%)  
 6  
 (2.27%), 11 (4.1%), MMT 1 (0.4%)  
 1 (0.4%)  
 , AGUS가  
 1996 1 1996 12  
 415  
 169 75 (44%)  
 14 (8.3%), 7 (4.1%), 10  
 (5.9%) 31 (18.3%)  
 (Table 8). 46 (27%),  
 10 (5.9%), IUD 4 (2.4%)  
 3 (1.8%)

Table 8. Histologic diagnoses of benign endometrial cells in Paps

Histology	No.	%
Normal endometrium	75	44.4
Endometrial polyp	14	8.3
Endometrial hyperplasia	7	4.1
Adenocarcinoma	10	5.9
Others*	63	37.3
Total	169	100.0

\* endometriosis, anovulatory bleeding, IUD etc

(reproducibility) 가

TBS Pap smear 가 0.03% .16)

TBS 가 .67) 가 가

가 TBS (medical consultation) 가 28.25%

가 TBS (medical consultation) 가 20.5% 가 7.58%

가 CervexBrush<sup>®</sup> .1516) cytobrush

가 가 TBS) ASCUS 가

가 (satisfactory for evaluation), 가 가 19) ASCUS

가 (satisfactory for evaluation but limited by) 가 가 8.4%

가 (satisfactory for evaluation) 3가 4가 가 가

가 (transformation zone) 가 가 가

가 1992 600 가 CAP survey 15) 가 가

0 20% 가 0 가 ASCUS 1988 TBS

0.5 1% 40% 3.0 4.9% 가 가 (un-determined) .46) 1991

TBS 가 TBS ASCUS

7) ASCUS

1992 NCI workshop HPV ASCUS ASCUS

ASCUS communication ASCUS HPV LSIL

communication HSIL ASCUS

ASCUS가 가 ASCUS

ASCUS LSIL HSIL ASCUS

ASCUS / ASCUS 가

ASCUS , Tricho- ASCUS

monas, Candida 가 ASCUS

(downgrade) 가 ASCUS

40 , , 가

Pap smear . 1992 NCI workshop) ASCUS

TBS 5% ASCUS가

5% ASCUS

SIL 가

ASCUS

가 ASCUS

가 ASCUS

(upgrade) ( ASCUS "atypia", "inflammatory atypia", "class II" (

ASCUS LSIL ) TBS BCC .)

가 ASCUS 가 ASCUS TBS

(severity) 가 가 0.7 9% 11-12) 1993 1600

가 CAP survey 2.8%

1) ASCUS

.1) TBS criteria) ASCUS University lab 6.0% , Hospital lab

2.5 3 2.4% ASCUS

N/C ratio 가가 가 5,000 2.1%

50,000

3.8%  
 ASCUS TBS  
 2 가 1.24% 2.88  
 % 2.1%  
 60,000 70,000

AGUS 가

SIL 1.25% 2.12% 2.06%  
 survey 1.3 ASCUS/SIL ratio 1.24 CAP  
 SIL ASCUS CAP survey  
 가 University lab ASCUS,  
 LSIL, HSIL 50,000  
 lab lab 가  
 ASCUS/SIL ratio ASCUS/SIL ratio  
 90% 4 ASCUS  
 ASCUS  
 ASCUS/SIL ratio

가  
 가 ASCUS  
 가 SIL 12) ASCUS  
 SIL ASCUS  
 가 recommendation  
 written guideline  
 ASCUS

18) 30,488 1.6%, 19) 450 8.4%,  
 20) 11,403 2.1% 21) 10,630  
 5.7% ASCUS/SIL ratio  
 20) 0.48 21) 2.13 CAP survey  
 1.3 1.24

SIL 10 61%  
 22) ASCUS 1/3 SIL  
 TBS  
 (squamous atypia)  
 SIL 26%  
 TBS 33% 가가  
 가 TBS  
 18) 27.5%  
 30% 가

가  
 가가

ASCUS SIL LSIL HSIL  
 30% SIL  
 18% LSIL, 11% HSIL, 1%  
 Darnell Jones 30) 25% SIL 20%  
 LSIL, 5% HSIL Davis 31)  
 18% SIL LSIL 9.1%, HSIL 7.6%  
 Abu-Javodeh 32) 31% SIL 18%  
 LSIL, 13% HSIL

“(cytologic correlation: well correlated)”

(discrepancy)가  
 recommend 가  
 가

ASCUS  
 ASCUS  
 20) ASCUS  
 21) 39.1%(36/92)  
 45.8%(33/72 )

) SIL HPV type  
 30%(57/190 )

ASCUS  
 LSIL HSIL LSIL HSIL  
 가  
 가 HPV  
 2) 18.1%, 19.5% 9.7% 2) 21.7%, .34) TBS koilocytotic atypia LSIL  
 14.2% 3.3% 18%, 11% 1% koilocytosis  
 가 ASCUS가  
 SIL 가 koilocytosis  
 1%  
 ,2) 2) Lee 3) mild  
 9.7%, 3.3% dysplasia koilocytosis  
 1  
 2mm SIL 가 koilocytosis  
 mild dysplasia  
 2) ASCUS 13.8  
 % (9/65 ) 가  
 ASCUS 29.4%(5/17 )가 CIN II (severity of abnormality)  
 3) Lee 3)  
 14%(20/142  
 ), 77%(37/48 )  
 SIL .3)  
 (Chi-Square test, P < 0.0001).  
 TBS가 artifact,  
 가  
 가 communication ASCUS HPV DNA  
 SIL  
 .3) Jovanovic 13) koilocytotic atypia  
 ASCUS SIL  
 . ASCUS PSA  
 Jovanovic  
 .3) 가 ASCUS 8 8 가  
 ASCUS PSA 2 SIL  
 . HSIL LSIL ASCUS 32  
 24 가 PSA 3 LSIL  
 가 CIN II (mo- ASCUS 40 7 (17.5%) LSIL  
 derate dysplasia) CIN III HSIL 30%  
 LSIL 43  
 ASCUS 3 , PSA 26 , LSIL 14

ASCUS 3 1 , PSA 26 7 , LSIL 14  
 7 LSIL 43 15 (34.9%) LSIL  
 58%  
 PSA 3) ASCUS .6  
 LSIL 60 18 , , IUD,  
 ASCUS, 27 LSIL 15  
 . 18 ASCUS (endometrial meta-  
 ASCUS가 5 , LSIL 5 VAIN I-II가 1 plasia) 가 AGUS  
 . 27 LSIL 2  
 ASCUS, 20 CIN, 1 VAIN 가 .4) cytobrush  
 4 .

(koilocyte) 가 가 가 AGUS  
 .44-4) Cytobrush  
 brush  
 (parabasal cell) artifact AGUS .44-5)  
 (parakeratotic cell) .3) 가  
 ASCUS 가 .4) 가

communication  
 (lower uterine segment) 가  
 .47) ASCUS  
 HPV-DNA 가  
 .3) ASCUS  
 AGUS AGUS  
 ASCUS

(BCC) 가 가  
 가  
 .45) AGUS  
 ASCUS 0.15%  
 0.74% 0.5% .485)  
 18) 0.32%,  
 2) 0.31% 2) 0.12%  
 0.08%  
 가 가

AGUS

TBS 1991 1992

18)

가

AGUS

.4)

AGUS

HSIL

가

가

AGUS

Kennedy

4) 5

ASCUS

가 4.5%

AGUS

0.2%

가

AGUS

15%

LSIL 4%, HSIL 5% 9%가

가

AGUS

4%, 3%

7%

5)

Goff

5) AGUS

6 (2.2%),  
(0.4%)

11 (4.1%), MMTT 1

(0.4%)

가

8%, 3%

11%

AGUS

50%

AGUS 268 67 (25%)

48 (17.9%) LSIL 4

(1.5%), HSIL 24 (9.0%)

.4)

8 (3.0%),

5 (1.9%),

AGUS

3 (1.1%)

4 (1.5%)

가

10.5%

7.5%

AGUS

가

HSIL

AGUS

AGUS

(undifferenti-

ated reserve cell)

(second opinion)

4) AGUS

.4)54)

가

(clus-

가

12

tering),

(feathered appearance),

(anisonucleosis)

.14)

가

.4)

(stromal cell)가

가

가

40

37%

26%

Cherkis 5)

1991 1997

ASCUS AGUS

179 23.9%

1. 1991 1 1997 12 447,049

TBS

11.2%

169 75 (ASCUS, AGUS, LSIL, HSIL & Cancer)

(44.4%) 14 (8.3 4.4%

%, 7 (4.1%) 10 1995

(5.9%)

가

SIL

1988 1992 13 26 20

2. ASCUS 2.1% SIL

1993 31 38 34.1 가

2.06% ASCUS/SIL ratio 1.24

49 5) . AGUS 0.08% ASCUS

가

ASCUS

60%(30/49 ) AGUS 16%(8/49 )

ratio

23%(11/49 )

3. 1997 5 1997 12 47,525

TBS 가

71.7%,

28.3% 0.03%

, IUD ,

(20.5%) (7.58%)가 가

가

가

4. 1993 5 1994 12

ASCUS ASCUS-

SIL ratio

ASCUS 190 57 (30%)

35 (18%), 21 (11%),

1 (1%)

ASCUS 31 (18.3%)  
 ASCUS 190  
 가 142 (75%),  
 48 (25%)  
 ASCUS 142 20 (14%)  
 48 37 (77%)  
 TBS  
 TBS  
 ASCUS  
 ASCUS, AGUS  
 SIL  
 ASCUS  
 recomme-  
 ndation  
 5. 1995 1 1995 12 ASCUS  
 LSIL 50  
 ASCUS 8  
 LSIL 32 LSIL 43  
 83  
 34.9%(15/43 ) LSIL  
 LSIL  
 6. 1991 5 1996 12 AGUS  
 268 67 (25%)  
 48 (17.9%)  
 19 (7.1%)  
 LSIL 4 (1.5%), HSIL 24 (9.0%)  
 28 (10.5%)  
 20 (7.5%)  
 8 (3.0%), 5  
 (1.9%), 3 (1.1%) 4  
 (1.5%) AGUS  
 6  
 (2.2%), 11 (4.1%), MMT  
 1 (0.4%)  
 AGUS  
 7. 1996 1 1996 12  
 415  
 169 14 (8.3%),  
 7 (4.1%), 10 (5.9%)

- References -

1. Koss LG. Cervical (Pap) smear: New directions. *Cancer* 1993; 71: 1406-12.
2. Hatem F, Wilbur DC. High grade squamous cervical lesions following negative Papanicolaou smears: False-negative cervical cytology or rapid progression. *Diagn Cytopathol* 1995; 12: 135-41.
3. Bergeron C. Improving the screening of cervical precancerous lesions by improving laboratory quality assurance in cytology. *J Low Genit Tr Dis* 1998; 2: 25-30.
4. National Cancer Institute Workshop. The 1988 Bethesda system for reporting cervical/vaginal cytological diagnoses. *JAMA* 1989; 262: 931-4.
5. . The Bethesda System. - 1995; 6: 85-98.
6. Kurman RJ, Solomon D. The Bethesda system for reporting cervical/vaginal cytological diagnoses: Definitions, criteria, and explanatory notes for terminology and specimen adequacy. New York; Springer-Verlag, NY INC; 1994: 30-73.
7. Bethesda Workshop. The Revised Bethesda System for reporting cervical/vaginal cytologic diagnoses: Report of the 1991 Bethesda Workshop. *Acta Cytol* 1992; 36: 273-6.
8. Kurman RJ, Norris HJ, Wilkerson E. Tumors of the cervix, vagina and vulva. In; Rosai J, Sobin LH, editors. *Atlas of tumor pathology. Third series. Fascicle 4.* Washington, DC: Armed Forces Institute of Pathology. 1992: 44-54.

9. Ambros RA, Kurman RJ. Current concept in the relationship of human papillomavirus infection to the pathogenesis and classification of precancerous squamous lesions of the uterine cervix. *Semin Diagn Pathol* 1990; 7: 158-72.
10. Crum CP, Nuovo GJ. The cervix. In: *Diagnostic Surgical Pathology*. 2nd ed., Raven Press, New York. 1994: 2055-90.
11. Davey DD, Naryshkin S, Nielson ML, et al. Atypical squamous cells of undetermined significance: Interlaboratory comparison and quality assurance monitors. *Diagn Cytopathol* 1994; 11: 390-6.
12. Selvaggi SM, Haefuer HK. Reporting of atypical squamous cells of undetermined significance on cervical smears: Is it significant? *Diagn Cytopathol* 1995; 13: 352-6.
13. Jovanovic AS, McLachlin CM, Shen L, et al. Postmenopausal squamous atypia: A spectrum including "pseudokoilocytosis". *Mod Pathol* 1995;8:408-12.
14. Ng ABP, Reagan JW. Histology and cytology of normal and hyperplastic endometrium. In: *Compendium on diagnostic cytology*. 8th ed., Chicago, IL, 1997: 128-38.
15. Davey DD, Nielson ML, Rosenstock W, et al. Terminology and specimen adequacy in cervicovaginal cytology. The College of American Pathologists interlaboratory comparison program experiences. *Arch Pathol Lab Med* 1992; 116: 903-7.
16. Nielsen ML, Davey DD, Kline TS. Specimen adequacy evaluation in gynecologic cytopathology: Current laboratory practice in the College of American Pathologists interlaboratory comparison program and tentative guidelines for future practice. *Diagn Cytopathol* 1993; 9: 394-403.
17. Kurman RJ, Henson DE, Herbst AL, et al. Interim guidelines of management of abnormal cervical cytology. *JAMA* 1994; 271: 1866-9.
18. . . . Bethesda System "atypical squamous cells of undetermined significance" 가. 1993; 4: 81-6.
19. . . . Hybrid Capture System HPV DNA Test 1996; 7: 199-207.
20. . . . (ASCUS-LSIL) 가. 1997; 40: 349-59.
21. . . . ASCUS, AGUS LSIL 1997; 40: 1436-49.
22. Goff BA, Muntz HG, Bell DA, et al. Human Papillomavirus typing in patients with Papanicolaou smear showing squamous atypia. *Gynecol Oncol* 1993; 48: 384-8.
23. Cox JT, Lorincz AT, Schiffman MH, et al. HPV testing by hybrid capture appears to be useful in triaging women with a cytologic diagnosis of ASCUS. *Am J Obstet Gynecol* 1995; 172: 946-54.
24. Noumoff JS. Atypia in cervical cytology as a risk factor for intraepithelial neoplasia. *Am J Obstet Gynecol* 1987; 156: 628-31.
25. Pearlstone AC, Grigsby PW, Mutch DG. High rates of atypical cervical cytology: Occurrence and clinical significance. *Obstet Gynecol* 1992; 80: 191-5.
26. Lindheim SR, Smith-Nguyen G. Aggressive evaluation for atypical squamous cells in Papanicolaou smears. *J Rep Med* 1990; 35: 971-3.
27. Miyazawa CK, O'Connor CD. Problems dealing with atypical cervical cytology. *Colposcopist* 1991; 23: 1-4.
28. Andrus S, Hernandez E, Miyazawa K. Paired Papanicolaou smears in the evaluation of atypical squamous cells. *Obstet Gynecol* 1989; 73: 747-50.
29. Sidawy MK, Tabbara SO. Reactive change and atypical squamous cells of undetermined significance in Papanicolaou smears: A cytohistologic correlation. *Diagn Cytopathol* 1993; 9: 423-9.
30. Darnell Jones DE, Creasman WT, Dombroski RA, et al. Evaluation of the atypical Pap smear. *Am J Obstet Gynecol* 1987; 157: 544-9.
31. Davis GL, Hernandez E, Davis JL, et al. Atypical squamous cells in Papanicolaou smears. *Obstet Gynecol* 1987; 69: 43-6.
32. Abu-Jawdeh GM, Trawinski GM, Wang HH. Histocytologic study of squamous atypia on Pap smears. *Mod Pathol* 1994; 7: 920-4.

33. Committee on Technical Bulletins of the American College of Obstetricians and Gynecologists. Cervical cytology: Evaluation and management of abnormalities. ACOG Tech Bull 1993; 183: 1-8.
34. Klinkhamer PJJM, Voojis GP, de Haan AFJ. Intra-observer and interobserver variability in the diagnosis of epithelial abnormalities in cervical smears. Acta Cytol 1988; 32: 794-800.
35. Joste NE, Rushing L, Granados R, et al. Bethesda classification of cervicovaginal smears: Reproducibility and viral correlates. Hum Pathol 1996; 27: 581-5.
36. Lee KR, Minter LJ, Crum CP. Koilocytotic atypia in Papanicolaou smears. Reproducibility and biopsy correlations. Cancer Cytopathol 1997; 81: 10-5.
37. Hall S, Wu TC, Soudi N, et al. Low grade squamous intraepithelial lesions. Cytologic predictions of biopsy confirmation. Diagn Cytopathol 1994; 10: 3-9.
38. Saminathan T, Lahoti C, Kannan V, et al. Postmenopausal squamous-cell atypias: A diagnostic challenge. Diagn Cytopathol 1994; 11: 226-30.
39. Ferenczy A, Gelfand MM, Franco E, et al. Human Papillomavirus infection in postmenopausal women with and without hormonal therapy. Obstet Gynecol 1997; 90: 7-11.
40. Brown LJR, Wells M. Cervical glandular atypia associated with squamous intraepithelial neoplasia: A premalignant lesion. J Clin Pathol 1986; 38: 22-8.
41. Cox JT. ASCCP practice guidelines; Management of glandular abnormalities in the cervical smear. J Low Genit Tr Dis 1997; 1: 41-5.
42. Johuson TL, and Kini SR. Endometrial metaplasia as a source of atypical glandular cells in cervicovaginal smears. Diagn Cytopathol 1996; 14: 25-31.
43. Koike N. Efficacy of the cytobrush method in aged patients. Diagn Cytopathol 1994; 38: 310-14.
44. Wilbur DC. The cytology of the endocervix, endometrium, and upper female genital tract. In: Bonfiglio TA and Erozan YS. Gynecologic Cytopathology. Lippincott-Raven, Philadelphia, 1997: 107-44.
45. Chakrabarti B. Brush versus spatula for cervical smears. Acta Cytol 1994; 38: 315-18.
46. Bose S, Kannan V, Kline TS. Abnormal endocervical cells : Really abnormal ? Really endocervical ? Am J Clin Pathol 1994; 101: 708-13.
47. Lee KR. Atypical glandular cells in cervical smears from women who have undergone cone biopsy. A potential diagnostic pitfall. Acta Cytol 1993; 37: 705-9.
48. Kennedy AW, Salmieri SS, Wirth SL, et al. Results of the clinical evaluation of atypical glandular cells of undetermined significance (AGUS) detected on cervical cytology screening. Gynecol Oncol 1996; 63: 14-8.
49. Jaworski RC, Pacey NF, Greenberg ML, et al. The histologic diagnosis of adenocarcinoma in situ and related lesions of the cervix : Adenocarcinoma in situ. Cancer 1988; 61: 1171-81.
50. Lee KR, Manna EA, and Jones MA. Comparative cytologic features of adenocarcinoma in situ of the uterine cervix. Acta Cytol 1991; 35: 117-26.
51. Goff RA, Atanasoff P, Brown E, et al. Endocervical glandular atypia in Papanicolaou smears. Obstet Gynecol 1992; 79: 101-4.
52. Pisharodi LR, Ramirez N, Gudlangsson E, et al. The spectrum and significance of atypical glandular cells of undetermined significance (AGUS) on Papanicolaou smears. Acta Cytol 1994; 38: 794-5.
53. Wilbur DC, Mulford DM, Sickel JZ, et al. The problem of endocervical atypia: New cytologic presentations of normal endocervical cells and squamous neoplasia. Acta Cytol 1994; 38: 808-9.
54. Currie MM, Casm Z, Balign M, et al. The significance of atypical glandular cells on Papanicolaou smears: An eight-year follow-up study. Acta Cytol 1994; 38: 810.
55. Ng ABP, Reagan JW, Hawliezak S, et al. Significance of endometrial cells in the detection of endometrial adenocarcinoma and its precursors. Acta Cytol 1974; 18: 356-61.
56. Cherkis RC, Patten SF Jr, Andrews TJ, et al. Significance of normal endometrial cells detected by cervical cytology. Obstet Gynecol 1988; 71: 242-4.
57. . . . Papanicolaou smear : . . . 1993; 4: 93-9.