

A PRELIMINARY STUDY ON THE PLACE OF CELL COUNT AND CORNIFICATION INDEX IN THE DIAGNOSIS OF EARLY CANCER CERVIX UTERI BY VAGINAL SMEAR

by

NAGEN GHOSH, M.B., D.G.O., D.R.C.O.G.,
*Chittaranjan Seva Sadan College of Obstetrics, Gynaecology
and Child Health and Group of Hospitals.*

This is an issue which evolved during the process of study of a series of 1,550 vaginal smears following the method and technique of Papanicolaou and Traut (1941), with a primary object to diagnose and find out the incidence of early cancer of cervix uteri amongst 1,300 clinically unsuspected women (chronic cervicitis with erosion included), and finally with a secondary object to compare and find out the relation of cell count and cornification index between a series of cancer positive smears obtained from amongst these 1,300 smears and those of 250 smears taken under various physiological and benign pathological conditions of human female life cycle, with a view to establish any possible place these cell count and cornification indices can have in the diagnosis of early cancer cervix. The latter 250 smears, out of the total 1,550 vaginal smears, included infancy, childhood, puberty, menstrual cycle, pregnancy, puerperium, amenorrhoeas, abortions, metropathia and menopause (Group A). The 1,300 smears taken exclusively from clinically unsus-

pected cases included all parous women, the age group being twenty-five upwards (Group B).

The whole work was carried out at the Central Laboratory of Chittaranjan Seva Sadan College and Chittaranjan Cancer Hospital. The results are shown in Tables I and II†.

It is now well established that under certain physiological or benign pathological conditions, where there is predominance of oestrogen action, the number of mature or superficial cells exfoliated in the vagina increases, while at the same time, the number of immature or basal layer cells go down, and also during this process, the nuclei of the mature cells get more and more compact and smaller in size until they become pyknotic and the cells are then referred to as cornified. By the term cornification index is meant a simple count of the cornified cells, expressed as a percentage of all squamous cells.

Amongst the 1,300 smears from clinically unsuspected women an

* Synopsis of the paper read at the Hyderabad Obstetrics and Gynaecological Congress—January, 1959.

† The results were shown at the Congress by projecting about thirty lantern slides to present tables and graphs on comparative cell count and cornification index and also different cell patterns.

TABLE I
Average Cell Count and Cornification Index under Different Conditions
of Human Life Cycle including Cancer Cervix Uteri

Period of life	Condition or age	Inter-mediate cells	Super-ficial cells	Basal cells	Cornification index
Infancy	1st 24 hours	57.5%	41.3%	1.1%	41.2%
"	3rd day	59.8%	34.7%	5.6%	40.4%
"	5th day	58.5%	34.9%	6.5%	31.5%
"	10th day	46.9%	20.9%	32.1%	19.3%
Childhood	3 years	20%	10.4%	69.6%	2.4%
"	4 years	18.2%	12.5%	69.2%	1.9%
"	5 years	15.2%	3.8%	80.9%	1.9%
"	6 years	12.3%	1.9%	85.7%	1.9%
"	7 years	13%	2%	85%	2%
"	8 years	12%	3%	85%	1%
"	9 years	13.8%	1.9%	84.3%	1.9%
"	10 years	19.7%	1.9%	78.4%	0.9%
Puberty	12 years	20.6%	75.6%	3.8%	46%
"	13 years	20.1%	77.6%	2.3%	49.3%
"	14 years	19.8%	74.2%	5.9%	44.5%
Adult	1st day of menstruation	35.4%	61.4%	3.2%	20.7%
"	3rd day of menstruation	24.8%	55.6%	19.5%	27.3%
"	6th day of menstruation	32.3%	58.9%	8.8%	54.7%
"	11th day of menstruation	27.2%	71.4%	1.3%	71.1%
Adult	13th day of menstruation	29%	70%	0.9%	75.3%
"	16th day of menstruation	36.8%	59.7%	3.5%	59.1%
"	22nd day of menstruation	44.2%	52.8%	2.9%	35.3%
"	28th day of menstruation	39.9%	58.7%	1.3%	29.7%
"	Just before starting of menstruation ..	37.6%	59.4%	3.9%	22.5%
"	Pregnancy: 3rd month ..	57%	41.0%	1.9%	7.7%
"	Pregnancy: 6th month ..	70.4%	28.6%	0.9%	14.0%
"	Pregnancy: full time ..	78.4%	19.4%	2.2%	11.6%
"	Pregnancy: labour ..	65.3%	30.4%	4.2%	25.1%
"	Puerperium: 1st day ..	59.6%	31.6%	8.7%	26.5%
"	Puerperium: 3rd day ..	73.9%	7.6%	18.5%	1.9%
"	Puerperium: 10th day ..	18.3%	0.2%	81.4%	0.2%
"	Puerperium: 20th day ..	67.9%	17.3%	14.8%	8.9%
"	Puerperium: 30th day ..	65.6%	27.7%	6.6%	11.4%
"	Puerperium: 45th day ..	63.8%	31.8%	4.4%	22.0%
Adult	Puerperal sub-involution	19.7%	3.8%	76.4%	1.9%
"	Metropathia	27.1%	70.7%	2.1%	64.3%
"	Atrophic menopause ..	31.4%	12.6%	55.9%	1.9%
"	Simple chronic cervicitis with erosion	40.5%	50.5%	8.9%	46.5%
"	Chronic cervicitis with trichomonas infestation	37.7%	53.9%	8.3%	64.5%
"	Cancer cervix	19.4%	60.3%	20.3%	68.2%

Bold figures show contrasting basal-cell count and cornification index under certain condition of life.

Black underlines show high cornification index indicating significance in trichomonas infestation and cancer cervix.

Dotted underlines show comparatively higher count of basal cells associated with high cornification index indicating significance in cancer cervix.

incidence of 1.38 per cent of early cancer cervix was obtained with an accuracy of 94.4 per cent.

Previously Ayer (1944) and more recently Winifred (1955) and Wachtel (1956) stated that in cancer of uterus, the percentage of exfoliated cornified cells increases or, in other words, the cornification index becomes high in uterine cancer. It is at the latter part of 1956, Ruth Dearing et al. stated that, in addition to high cornification index, there occurs an increased number of basal cells in the cancer group.

A significantly high cornification index simultaneously not associated with a low basal cell count, on the contrary a moderately high basal cell count, occurred in cancer smears, unlike smears under all other non-cancerous conditions in the present study. Tables I and II and Figs. 1, 2, 3.

Amongst the 10 cancer smears in which counting of cells and cornification were made, a minimum basal cell count of 15 per cent was found in only one, but in all the other 9 it

was higher than this figure and a level as high as 26.3 per cent was obtained. Simultaneously with this, a minimum cornification index of 60.6 per cent was found in only one smear, which in the rest 9 smears was much above this level and a level as high as 71.5 per cent was obtained. The average basal cell count and cornification index in 10 cancer positive smears were 20.3 per cent and 68.2 per cent respectively, thus showing a comparatively much higher count of basal cells associated with high cornification index, indicating significance in smear of cancer cervix.

By virtue of the above significant fact, the cell count and cornification index are considered, in conclusion, to play at least some suggestive role during future diagnosis of early cancer of cervix uteri by vaginal smear, although for positive diagnosis, either actual cancer cells or cells highly suspicious of cancer must be found out, if necessary by repeated smear study, and the diagnosis be ultimately confirmed by biopsy of cer-

TABLE II
Cell Count and Cornification Index in Ten Cases of Carcinoma Cervix

Case no.	Reg. no.	Age	Intermediate cells	Superficial cells	Basal cells	Cornification index
1	10415	51	19%	56.2%	24.7%	60.6%
2	10793	45	21.5%	57.9%	20.5%	66.3%
3	11655	55	20%	53.7%	26.3%	69.0%
4	11968	50	24.5%	55.4%	20%	70.9%
5	1099	35	16.6%	65.8%	17.5%	66.6%
6	2097	62	18.1%	60.3%	21.5%	67.2%
7	3240	43	21.1%	61.4%	17.4%	67.9%
8	6115	26	26.4%	58.5%	15%	67.9%
9	1116	55	15%	64%	21%	69%
10	4713	46	11.7%	69.6%	18.6%	71.5%
Average			19.39% ± 1.38	60.27% ± 1.53	20.25% ± 1.08	68.2% ± 1.00

vix, which should preferably be a ring or cone biopsy. With this view in mind I recently devised two instruments to take biopsy from cervix. See Fig. 4.

Acknowledgments

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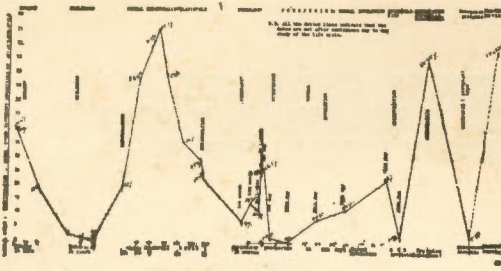


Fig. 1
Human Life Cycle: Vaginal cornification curve under different conditions, including cancer cervix uteri.

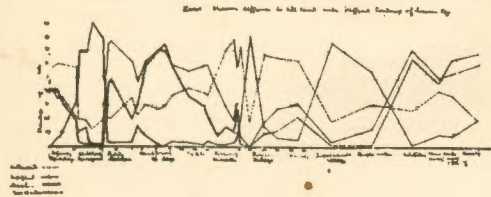


Fig. 2
Human Life Cycle: Cell count and cornification curve under different conditions including cancer cervix.

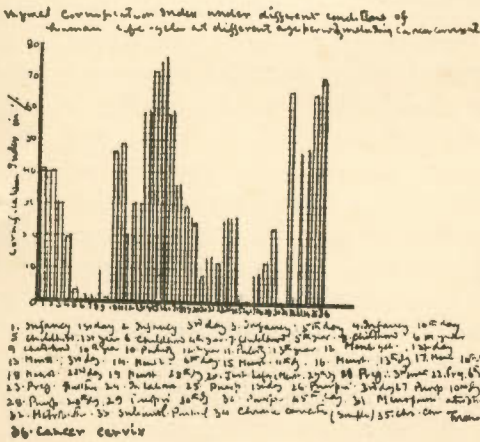


Fig. 3
Human Life Cycle: Vaginal cornification at different stages of life cycle under different conditions, including cancer cervix uteri.

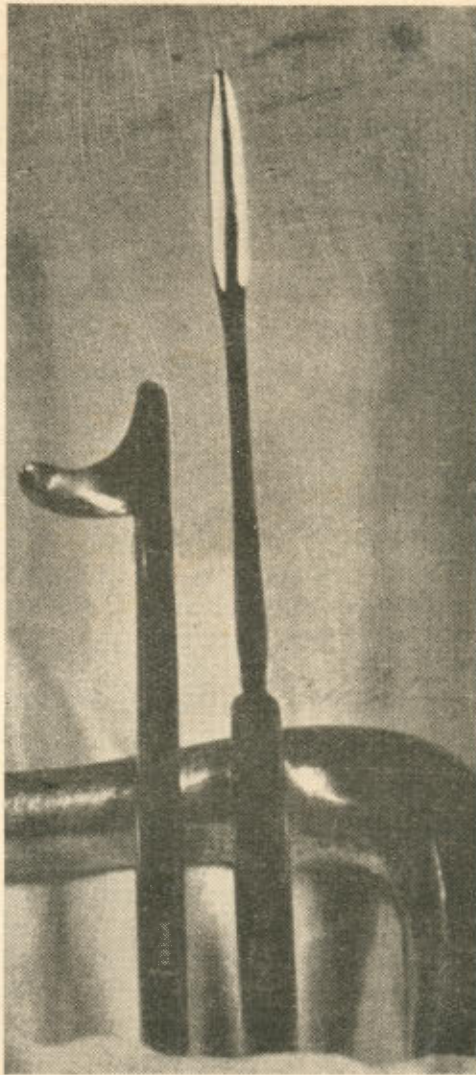


Fig. 4
These two instruments were recently designed by the author for ring and cone biopsies from the cervix. The right-hand instrument is a thin bladed double edged sharp knife with the blade placed at an obtuse angle with the handle. The other instrument consists of an obliquely transverse sharp cutting shelf 1 1/4" fixed to a handle which has a circular knob with rough surface at the end opposite to the cutting blade, to allow turning of the instrument in the clockwise direction, while placed inside the cervix and pressed on the squamo-columnar junction so that a cone of tissue can be obtained for histological section.