Electron Microscopic Study of the Distribution of the Mouse Leukemia Virus (Gross) in Genital Organs of Virus-injected C3Hf Mice and of AK Mice

DOROTHY G. FELDMAN AND LUDWIK GROSS

Cancer Research Unit, Veterans Administration Hospital, Bronx, New York 10468

SUMMARY

An electron microscope study of the genital organs of male and female mice carrying the mouse leukemia virus revealed the presence of virus particles both in strain AK mice which naturally carry the virus, and in C3Hf mice injected with the virus. There was no significant difference in the distribution and quantity of particles observed in the genitals of AK and virus-injected C3Hf mice.

The virus particles appeared in ovaries, oviducts, uteri, epididymis, vas deferens, seminal vesicles, and prostate of nonleukemic and leukemic AK mice and virus-injected nonleukemic and leukemic C3Hf mice. In general, a greater number of particles appeared in the genital organs of leukemic than nonleukemic virus-injected animals. Budding of particles was observed from cells of the theca folliculi and corpus luteum of ovaries, and from epithelial cells and connective tissue fibroblasts of other genital organs. Occasionally, particles appeared to form from endothelial cells of capillaries and arterioles of ovaries or testes, from smooth muscle cells of arterioles of ovaries, and from smooth muscle cells of oviducts. Doughnut-type particles and particles with nucleoids were usually present in intercellular spaces or lying free within the tubular or glandular lumen of various organs.

Normal noninjected C3Hf male and female mice were also studied, but no virus particles were noted in any of the genital organs examined.

INTRODUCTION

The natural transmission of the mouse leukemia virus from one generation to another through the embryos has been demonstrated in studies on high-leukemic virus carrying inbred lines such as AK or C58 (8, 11, 12). It was shown conclusively that development of leukemia or lymphomas in AK mice and virus-injected nonleukemic and leukemic C3Hf mice. In general, a greater number of particles appeared in the genital organs of leukemic than nonleukemic virus-injected animals. Budding of particles was observed from cells of the theca folliculi and corpus luteum of ovaries, and from epithelial cells and connective tissue fibroblasts of other genital organs. Occasionally, particles appeared to form from endothelial cells of capillaries and arterioles of ovaries or testes, from smooth muscle cells of arterioles of ovaries, and from smooth muscle cells of oviducts. Doughnut-type particles and particles with nucleoids were usually present in intercellular spaces or lying free within the tubular or glandular lumen of various organs.

Normal noninjected C3Hf male and female mice were also studied, but no virus particles were noted in any of the genital organs examined.

Animals

C3Hf Mice. Fifteen mice (7 males and 8 females) of strain C3Hf, raised in our laboratory, were inoculated when less than 7 days old with the mouse leukemia (Gross) “passage A” virus filtrate. Four mice of each sex were sacrificed as soon as they developed leukemia at 2.5-3 months of age. The remaining 3 males and 4 females were sacrificed and used for electron microscopic studies at 5-6 weeks of age, prior to the development of symptoms of leukemia.

Ten normal, healthy, noninjected C3Hf mice (5 males and 5 females) ranging in ages from 1.5 to 8 months served as control animals; fragments of tissues from these mice were used for electron microscopic studies of the control series. As reported
previously (15), the incidence of spontaneous leukemia in untreated mice of this strain has not exceeded 1% in our laboratory.

AK Mice. Nine mice (5 males and 4 females) of high-leukemic strain AK, raised in our laboratory, were sacrificed at 2–10.5 months of age. Of these, 1 female and 2 males had leukemia, and 3 males and 3 females did not have symptoms of leukemia at the time they were used for electron microscopic studies. The incidence of spontaneous leukemia in mice of the AK strain raised in our laboratory, exceeded 85% (15).

Methods. Immediately after the donor mice were sacrificed by ether inhalation, female genital organs such as ovaries, oviducts, and uteri, and male genital organs such as testes, epididymis, vas deferens, seminal vesicles, and prostate were removed and fixed either directly in 1% phosphate-buffered osmic acid for 1–1.5 hours on ice, or alternatively in 4% glutaraldehyde for several days or weeks, followed by osmic acid. The specimens were dehydrated in successive changes of 50–100% ethanol, immersed in propylene oxide, and embedded in Epon.

The tissues were then sectioned with a diamond knife, and with a Porter-Blum microtome converted into a thermal advance model, and placed on uncoated 300 mesh copper grids. Sections were lightly coated with carbon, stained with uranyl acetate and lead hydroxide (4, 22), and examined in an RCA EMU-3F or 3G electron microscope at 50 kv.

The removal, isolation, and identification of genital organ fragments of AK and C3Hf male and female mice were accomplished skillfully, after considerable preliminary studies, by Miss Yolande Dreyfuss of our laboratory, aided and assisted by our consultant in pathology, Dr. Theodore Ehrenreich, and Miss Lorraine A. Moore, and also by Dr. Peter Hofstra of the Surgical Service of our hospital. In most instances, electron microscopic sections were matched by parallel studies of routine light microscope slides of the same tissue fragments.

TABLE 1

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<td>6,750</td>
<td>N</td>
<td>+</td>
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<td>12,450</td>
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* L, light microscopy; E, electron microscopy; I, infiltration; N, no infiltration.

† Approximate average number of particles per grid square using 300 mesh grids: 0, no particles observed; +, less than 5 (few); ++, 5–10 (moderate); ++++, more than 10 (abundant).

RESULTS

Female Genital Organs

Ovaries. C3Hf Females. Virus particles were observed in all 3 ovaries of virus-injected leukemic C3Hf females, and in 3 out of 4 ovaries from virus-injected nonleukemic females (Table 1). There appeared to be a greater number of particles in the ovaries of leukemic than in nonleukemic females. In all samples of ovaries from injected females, light microscopy revealed no evidence of leukemic infiltration. Thus far, particles were not observed in the 5 control specimens of ovaries from normal noninjected C3Hf females.

AK Females. Virus particles also appeared in the ovaries of one leukemic AK female examined and in 3 nonleukemic AK females (Table 2). As in C3Hf mice, particles seemed more abundant in the ovary of the leukemic female. Leukemic infiltration was apparent in the ovary of the leukemic female, but was not present in the 3 ovaries from nonleukemic females. The quantity of particles in the ovary of the leukemic AK female was similar to the leukemic C3Hf females; ovaries of nonleukemic AK and virus-injected nonleukemic C3Hf females contained a similar number of particles.

Formation and Location of Particles. In the ovaries of virus-injected C3Hf and of AK females, particles appeared to be formed primarily in 2 areas—the theca folliculi and the corpus luteum. Besides budding particles, doughnut-type particles and particles with nucleoids were observed in intercellular spaces in these areas. Fig. 1 is a low-magnification electron micrograph of the follicular epithelium (FE) and theca folliculi (TF) of a virus-injected leukemic C3Hf female. Separating the follicular epithelium from the theca folliculi is the basement membrane (bm). In this figure, the layer of theca folliculi proximal to the follicular epithelium has possibly differentiated into the theca interna. Higher magnifications of the outlined areas illustrate particles budding from the thecal cells (arrows, Figs. 1a, 1b).

Particles budding from cells of the corpus luteum are shown in Figs. 2 to 3. Fig. 2a (higher magnification of outlined area of Fig. 2) demonstrates a particle (arrow) budding from a luteal cell of a virus-injected nonleukemic C3Hf female. In Fig. 3, a luteal cell from a leukemic C3Hf female, one particle (arrow) appears to be budding from the cell membrane, and several
doughnut-type particles (d), a particle (n) with a nucleoid, and a particle (l) with a "tail" are free within an intercellular space.

On rare instances, particles in the ovaries also appeared to bud from endothelial cells of both capillaries (arrow, Fig. 6—leukemic C3Hf female) and arterioles (arrow, Fig. 4—leukemic C3Hf female), and from smooth muscle cells of arterioles (arrows, Fig. 5—nonleukemic AK female).

**Oviducts.** **C3Hf Females.** Particles were found in the oviducts of 4 virus-injected leukemic, and in 1 out of 2 virus-injected nonleukemic C3Hf females examined (Table 1). When present, particles appeared to be few in number. In the tissue samples of oviduct examined by light microscopy, there was no apparent infiltration by leukemic cells. In the 4 specimens of oviducts from normal noninjected C3Hf females, virus particles were not evident.

**AK Females.** A small number of particles appeared in oviducts of the leukemic AK female, and of both nonleukemic AK females (Table 2). Although light microscopic examination did not indicate leukemic infiltration in any of these specimens, in the electron microscope, infiltration was observed in the oviduct of the leukemic female. In this specimen, particles were associated with the leukemic cells only.

**Formation and Location of Particles.** In the oviducts of virus-injected C3Hf and of AK females, particles appeared to bud from epithelial cells and from fibroblasts of the underlying lamina propria. In leukemic C3Hf females, budding from smooth muscle cells was occasionally also observed. Fig. 7 illustrates ciliated epithelium of oviduct from a nonleukemic AK female. Situated in an intercellular space at the basal end of the cell is a doughnut-type particle (d) shown in Fig. 7†b (higher magnification of outlined area in Fig. 7).

In Fig. 9, section of oviduct from a leukemic C3Hf female, epithelial cells (E), basement membrane (bm), collagen (C), and part of a fibroblast (F) are indicated. Higher magnifications of the outlined areas illustrate a particle budding from the fibroblast (arrow, Fig. 9b) and a doughnut-type particle (d) situated in an intercellular space (Fig. 9a). An area from the smooth-muscle layer of oviduct from a leukemic C3Hf female is shown in Fig. 8. Collagen (C) is found between several cells. In a higher magnification of the outlined area (Fig. 8a), a particle (arrow) appears to be budding from the cell membrane of a smooth-muscle cell.

**Uteri.** **C3Hf Females.** Particles were observed in the uteri of all 4 virus-injected leukemic C3Hf females and in 2 out of 3 virus-injected nonleukemic females (Table 1). The uteri of the leukemic animals appeared to contain slightly larger numbers of particles. Light microscopy indicated an absence of leukemic infiltration in the samples studied. Examination of uteri from 4 normal noninjected animals did not reveal the presence of particles.

**AK Females.** A small number of particles was present in the uteri of the 1 leukemic and 2 nonleukemic females examined (Table 2). There were signs of leukemic infiltration in the uterus from the leukemic female, but none in uteri of the nonleukemic females.

**Formation and Location of Particles.** In the uteri of virus-injected C3Hf and of AK females, budding of particles seemed to occur from the epithelium and lamina propria of the endometrium. Particles also appeared singly and in small groups within intercellular spaces of these areas.

Section of uterus from a leukemic C3Hf mouse containing epithelium (E), basement membrane (bm), collagen (C), and fibroblasts (F) appears in Fig. 10. Higher magnification of the outlined area (Fig. 10a) illustrates a particle (arrow) budding from the cell membrane of a fibroblast. A particle (arrow) budding from an epithelial cell from uterus of a leukemic AK female is shown in Fig. 11. A desmosome (D) is also present.

### TABLE 3

**Electron Microscopic Study of Genital Organs from Male C3Hf Mice**

<table>
<thead>
<tr>
<th>Mouse No.</th>
<th>Age sacrificed (mo.)</th>
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<th>Epididymis</th>
<th>Vas deferens</th>
<th>Seminal vesicle</th>
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<td>L*</td>
<td>E*</td>
<td>L</td>
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</table>

* L, light microscopy; E, electron microscopy; I, infiltration; N, no infiltration.
* Approximate average number of particles per grid square using 300 mesh grids: 0, no particles observed; +, less than 5 (few); ++, 5–10 (moderate); +++, more than 10 (abundant).
* Particles appeared in association with infiltrated cells only.
Male Genital Organs

Testes. Careful electron microscopic examination did not thus far reveal the presence of virus particles in testes from 4 virus-injected leukemic, 3 virus-injected nonleukemic, and 5 non-injected normal C3Hf males (Table 3). Infiltration with leukemic cells occurring in testes of 2 leukemic C3Hf males was confined primarily to interstitial areas.

Study of testes from 3 nonleukemic AK mice did not reveal presence of virus particles (Table 4). In testes from 1 out of 2 leukemic AK mice, particles were found, but they appeared to bud from the epithelial cells of one capillary only. However, round, oval, or irregularly shaped vacuoles varying in size and occurring singly or in small groups were frequently noted in the cytoplasm of developing spermatozoa in testes of both normal and virus-injected C3Hf males, and also of AK males. These vacuoles contain either vesicles, small dense particles, fine granular material, or combinations of these 3 structures. The vesicles (v, Fig. 16), ranging in size from 45–100 m, consist of a single outer membrane varying in density and thickness; occasionally, a distinct double outer membrane was also observed. The fine structure and size of these vesicles differ from the typical doughnut-type particles previously described (5), which are 80–110 m in size and contain 2, 3, or more concentric membranes (see Figs. 24a, 26a). In addition, there was no evidence of particles budding or the presence of typical particles containing leukemic infiltration in the specimens examined.

Epididymis. C3Hf Males. Particles appeared in epididymis of all 3 virus-injected leukemic males and 2 out of 3 virus-injected nonleukemic males examined (Table 3). In the leukemic males, particles were slightly more numerous than in the nonleukemic males. Light microscopy revealed infiltration with leukemic cells in the epididymis of leukemic males only. Particles were not observed in epididymis of 5 normal noninjected C3Hf males.

AK Males. In epididymis of 2 leukemic and 3 nonleukemic males examined, particles were observed in few to moderate numbers (Table 4). There was no evidence of leukemic infiltration in any of the samples studied by light microscopy.

Location and Formation of Particles. In virus-injected leukemic and nonleukemic C3Hf mice, particles appeared to bud from the lateral surface of epithelial cells and from stereocilia. In addition, particles were observed singly or in few to moderate numbers in intercellular spaces; occasionally, small groups of particles were situated free within the lumen.

In epididymis of AK males, particles were rarely observed budding from the cell membrane of epithelial cells; however, they frequently appeared to bud from the endoplasmic reticulum of epithelial cells, forming cylindric and doughnut-type particles. Particles also were found budding from connective tissue fibroblasts, and free within the lumen of the epididymis.

Fig. 14 is a low power electron micrograph of epididymal epithelium from a virus-injected leukemic C3Hf male mouse. Golgi zone (G) is shown. Higher magnification of the outlined area (Fig. 14a) illustrates budding particles (arrows). Figs. 12, 13, and 15 are areas of epididymis from leukemic C3Hf males. A particle (arrow) budding from a stereocilium (S) projecting into the lumen is demonstrated in Fig. 15. In Fig. 13 several spermatozoa (Sp) appear within the lumen. A higher magnification of the outlined area (Fig. 13a) shows a particle (i) with a "tail." In Fig. 12, a group of particles (n) with nucleoids and part of a spermatozoan (Sp) are illustrated.

Areas of epididymis from a leukemic and nonleukemic AK male are demonstrated in Figs. 17 and 18, respectively. Appearing within the endoplasmic reticulum of the epithelial cells are doughnut-type particles (d), and cylindric particles (c) of varied lengths, which occasionally appear to be segmenting (arrow) eventually to form doughnut-type particles.

Smaller doughnut-type particles, previously described (5), are illustrated in Figs. 19 and 20, areas of epididymis from a virus-injected nonleukemic C3Hf male. They are shown budding from the endoplasmic reticulum (arrow, Fig. 20), or lying free within the endoplasmic reticulum (arrow, Fig. 19).

Vas deferens. C3Hf Males. Particles were observed in few numbers in vas deferens of all 3 virus-injected leukemic males and in 1 out of 3 virus-injected nonleukemic males (Table 3). Infiltration of leukemic cells was noted in the vas deferens of the leukemic, but not in the nonleukemic males. In vas deferens of 2 out of 3 leukemic males, particles were associated with infiltrated leukemic cells only. Particles were not observed in vas deferens of the 5 normal noninjected C3Hf males studied.

AK Males. Examination of vas deferens revealed the presence of a moderate number of particles in the leukemic male and few particles in 2 out of 3 nonleukemic males (Table 4). Infiltration by

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**Table 4**

Electron Microscopic Study of Genital Organs from Male AK Mice

<table>
<thead>
<tr>
<th>Mouse No.</th>
<th>Age (mo.)</th>
<th>Testis</th>
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* L, light microscopy; E, electron microscopy; I, infiltration; N, no infiltration.

Approximate average number of particles per grid square using 300 mesh grids: 0, no particles observed; +, less than 5 (few); ++, 5–10 (moderate); ++++, more than 10 (abundant).

Particles observed were budding from capillary endothelium only.
leukemic cells was not apparent in vas deferens of the nonleukemic males.

*Formation and Location of Particles.* Particles appeared to bud from the cell membranes of epithelial cells or from fibroblasts of the lamina propria. Groups of particles were occasionally observed in intercellular spaces of the lamina propria. Epithelium of vas deferens from a virus-injected nonleukemic C3Hf male is shown in Fig. 21. Higher magnification of the outlined area (Fig. 21a) illustrates a particle (arrow) in an early stage of budding from the cell membrane.

**Seminal Vesicles. C3Hf Males.** Particles were observed in few to moderate amounts in seminal vesicles of the 4 virus-injected leukemic and 3 virus-injected nonleukemic males studied (Table 3). Light microscopic examination of seminal vesicles from the leukemic males revealed leukemic infiltration; however, there was no evidence of infiltration in seminal vesicles of virus-injected nonleukemic males. Particles were not observed in seminal vesicles of the 5 normal noninjected males.

**AK Males.** In seminal vesicles of the 2 leukemic males, and in 1 out of 3 nonleukemic males, particles were observed (Table 4). Infiltration by leukemic cells was apparent in seminal vesicle of only one leukemic male.

*Formation and Location of Particles.* Particles appeared to bud from the lateral, basal, and luminal surfaces of epithelial cells, and from fibroblasts of the lamina propria. Particles, single or in groups, were observed in intercellular spaces, and lying free within the glandular lumen. In the lumen, particles were often found enmeshed in secretory material.

Budding of particles from the luminal surface of epithelial cells from a virus-injected nonleukemic C3Hf male is illustrated in Fig. 22 (arrow). Fig. 24 is a low-power electron micrograph of seminal vesicle from a nonleukemic AK male. A higher magnification of the outlined area (Fig. 24a) demonstrates a particle (arrow) budding from the cell membrane of a microvillus projecting into the lumen and a doughnut-type particle (d). Particles (n) with nucleoids lying free within the lumen proximal to the cell membrane appear in Fig. 22. In Fig. 23, budding of a particle (arrow) from a fibroblast (F) of the lamina propria is illustrated.

**Prostate. C3Hf Males.** Particles appeared in large numbers in the prostate of the 2 virus-injected leukemic C3Hf males and in few numbers in the 2 virus-injected nonleukemic C3Hf males (Table 3). Infiltration by leukemic cells occurred in the prostate of the 2 leukemic males, but not in the one nonleukemic male examined by light microscopy. Examination of the prostate from 2 normal noninjected control C3Hf males did not reveal the presence of particles.

**AK Males.** In the prostate of the one leukemic AK male examined few particles were observed, and in the 2 nonleukemic males moderate numbers of particles were noted (Table 4). Light microscopic examination did not indicate infiltration by leukemic cells in any of these specimens.

*Formation and Location of Particles.* Although budding of particles from epithelial cells of the prostate was rarely observed, small to large groups of particles frequently appeared in the glandular lumen. These particles usually contained nucleoids, and less often were of the doughnut-type. Budding of particles from fibroblasts was occasionally noted.

A low magnification electron micrograph of prostate from a virus-injected leukemic C3Hf male containing epithelial cells (E) bordering on the lumen is shown in Fig. 26. In a higher magnification of the outlined area (Fig. 26a), vesicles (v) of variable size, doughnut-type particle (d), and particles (n) with nucleoids are demonstrated. Fig. 25 is a low-magnification micrograph of prostate from a nonleukemic AK male. A higher magnification of the outlined area (Fig. 25a) illustrates a particle (arrow) budding from an epithelial cell membrane.

**Smaller, Doughnut-type Particles**

Particles, previously described in detail (5) which differ from the typical doughnut-type particle in size and morphology, appeared only occasionally and in very small numbers in various organs of the genital system. So far, these organs include ovaries from leukemic AK and C3Hf females, epididymis from normal noninjected and virus-injected nonleukemic and leukemic C3Hf males, seminal vesicles from virus-injected nonleukemic C3Hf males, and prostate from normal noninjected, and virus-injected nonleukemic and leukemic C3Hf males. The particles were more abundant in epididymis than in the other organs examined. Figs. 19 and 20 (arrows) demonstrate their presence within endoplasmic reticulum of epididymis from a virus-injected nonleukemic C3Hf male.

**DISCUSSION**

The mechanism of natural transmission of the mouse leukemia virus from parents to offspring through the embryo has not yet been elucidated. The role played by the genital organs in infecting the germ cells, and thereby the embryo, requires clarification. The ova and spermatozoa are apparently exposed to virus infection by numerous means. The ova develop in the ovary in which particles are formed in the theca folliculi and in the corpus luteum. The ova pass through the oviduct, the mucosa and smooth muscle cells of which also contain virus particles; here the ova are fertilized, thereby coming in contact with seminal fluid which contains particles formed from cells of the epididymis, vas deferens, seminal vesicle, and prostate. Finally, the ova are implanted in the uterus where particles are formed in the endometrium. Thus, the opportunity of the ovum to become infected is assured from its early development in the ovary, in its passage through the oviduct, until it reaches the uterus where it is finally embedded.

In the genital organs of males carrying the virus, the spermatozoa are exposed to virus infection as they pass through the epididymis, vas deferens, and the seminal vesicle and prostate glands. Since virus particles are present in the genital tract of virus-infected females, the spermatozoa are also exposed to infection in their passage through the uterus and oviduct on their way to fertilize the ovum. There is ample opportunity, therefore, for the ova and spermatozoa to become infected, and eventually form an embryo also carrying the virus.

Virus particles were found in approximately similar numbers in male and female genital organs of both AK mice and virus-injected C3Hf mice. Careful search did not reveal presence of virus particles in male and female genital organs of normal noninjected C3Hf control mice. This was rather unexpected since C3Hf mice are known to harbor a latent leukemogenic virus (13-15).
Dorothy G. Feldman and Ludwik Gross

The many similarities between the mouse leukemia and the chicken leukemia complex include the formation of virus particles in different organs of virus-carrying animals. It is of considerable interest that chicken lymphomatosis virus particles have been recently observed budding from epithelial cells of oviduct of infected hens (2).

REFERENCES

FIG. 1. Section of ovary from virus-injected leukemic C3Hf female demonstrating zones of follicular epithelium (FE) and theca folliculi (TF) separated by a basement membrane (bm). × 8,050.

FIGS. 1a, 1b. Enlargements of outlined areas of Fig. 1 showing particles (arrows) budding from cells of the theca folliculi. × 42,800.

FIG. 2. Corpus luteal cell from ovary of a virus-injected nonleukemic C3Hf female. × 33,600.

FIG. 2a. Higher magnification of outlined area of Fig. 2 showing a particle (arrow) budding from the cell membrane. × 62,000.

FIG. 3. Corpus luteal cell from ovary of a leukemic C3Hf female. A particle (arrow) is shown budding from the cell membrane; several doughnut-type particles (d) and a particle (t) with a "tail" appear in the intercellular space. × 42,800.

FIG. 4. An arteriole from ovary of a leukemic C3Hf female. A particle (arrow) appears to be budding from the cell membrane of the endothelium. × 37,450.

FIG. 5. Smooth-muscle cell from an arteriole of ovary from a nonleukemic AK female. Several particles (arrows) are shown budding from the cell membrane. × 29,960.

FIG. 6. Capillary from ovary of a leukemic C3Hf female. Part of an erythrocyte appears within the lumen at lower left and a particle (arrow) is budding from the cell membrane of the endothelium. × 42,800.

FIG. 7. Section of ciliated epithelium from oviduct of a nonleukemic AK female. × 18,880.

FIG. 7a. A higher magnification of the outlined area of Fig. 7 demonstrating a doughnut-type particle (d) situated in an intercellular space in the basal portion of the epithelium. × 62,000.

FIG. 8. A group of smooth-muscle cells from ovory of a leukemic C3Hf female. Collagen (C) appears between many of the cells. × 12,400.

FIG. 8a. Enlargement of outlined area of Fig. 8 illustrating a particle (arrow) budding from the cell membrane of a smooth-muscle cell. × 62,000.

FIG. 9. Section of oviduct from a leukemic C3Hf female containing epithelial cells (E), basement membrane (bm), collagen (C), and part of a fibroblast (F). × 23,600.

FIGS. 9a, 9b. Higher magnifications of the outlined areas of Fig. 9. A particle (arrow) budding from the fibroblast is shown in Fig. 9b and a doughnut-type particle (d) proximal to the fibroblast appears in Fig. 9a. × 62,800.

FIG. 10. Section of uterus from a leukemic C3Hf female containing epithelial cells (E), basement membrane (bm), collagen (C), and fibroblasts (F). × 17,200.

FIG. 10a. Higher magnification of the outlined area of Fig. 10 demonstrating a particle (arrow) budding from the cell membrane of a fibroblast. × 40,860.

FIG. 11. A particle (arrow) budding from the cell membrane of an epithelial cell from an ovary of a leukemic AK female. A desmosome (D) is shown. × 40,800.

FIG. 12. A section through the lumen of epididymis from a leukemic C3Hf male illustrating several particles (n) with nucleoids and part of a spermatozoan (Sp). × 62,000.

FIG. 13. Section of epididymis from a leukemic C3Hf male containing spermatozoa (Sp) within the lumen. × 10,540.

FIG. 13a. An enlargement of the outlined area of Fig. 13 demonstrating a particle (t) with a "tail." × 62,000.

FIG. 14. Section of epididymis from a leukemic C3Hf male containing a prominent Golgi zone (G). × 14,620.

FIG. 14a. Higher magnification of outlined area of Fig. 14 illustrating several budding particles (arrows). × 62,000.

FIG. 15. A particle (arrow) budding from a stereocilium (S) into the lumen of epididymis from a leukemic C3Hf male. × 62,000.

FIG. 16. A vacuole containing vesicles (v) from testes of a leukemic C3Hf male. × 46,500.

FIG. 17. Part of an epithelial cell of epididymis from a leukemic AK male. Present within the endoplasmic reticulum are several doughnut-type particles (d), and cylindric particles (c). × 42,800.

FIG. 18. Area of an epididymal cell from a nonleukemic AK male. Several cylindric particles (c) appear to bud from the endoplasmic reticulum. Occasionally, these particles seem to be segmenting (arrow) to form doughnut-type particles. × 74,200.

FIGS. 19, 20. Part of an epididymal cell from a virus-injected nonleukemic C3Hf male. A smaller doughnut-type particle (arrow) appears to be budding from the endoplasmic reticulum in Fig. 20. Two smaller doughnut-type particles (arrow) appear free within the endoplasmic reticulum in Fig. 19. × 62,000.

FIG. 21. Section of vas deferens from a virus-injected nonleukemic C3Hf male. × 9,200.

FIG. 21a. Enlargement of outlined area from Fig. 21 illustrating a particle (arrow) in an early stage of budding from an epithelial cell. × 62,000.

FIG. 22. Luminal portion of an epithelial cell of seminal vesicle from a virus-injected nonleukemic C3Hf male. A particle (arrow) appears to be budding from the cell membrane into the lumen. Within the lumen are several particles (n) with nucleoids. × 62,000.

FIG. 23. Part of a fibroblast (F) from lamina propria of seminal vesicle from a virus-injected nonleukemic C3Hf male. A particle (arrow) is apparently budding from the cell membrane of the fibroblast. × 42,800.

FIG. 24. Part of seminal vesicle epithelium from a nonleukemic AK male. Microvilli of the epithelial cells project into the lumen which contains some secretory material (upper left). × 12,400.

FIG. 24a. A higher magnification of the outlined area of Fig. 24 showing one particle (arrow) budding from a microvillus, and one doughnut-type particle (d) free within the lumen. × 62,000.

FIG. 25. Section of prostate epithelium from a nonleukemic AK male. × 23,600.

FIG. 25a. Enlargement of the outlined area of Fig. 25 demonstrating a particle (arrow) budding from the cell membrane of an epithelial cell. × 62,000.

FIG. 26. Section of prostate from a leukemic C3Hf male containing epithelial cells (E) and lumen filled with secretory material and particles. × 17,200.

FIG. 26a. Higher magnification of the outlined area of Fig. 26 illustrating doughnut-type particles (d), particles with nucleoids (n), and vesicles (v) of various sizes. × 84,800.
Leukemia Virus in Mouse Genital Organs
Electron Microscopic Study of the Distribution of the Mouse Leukemia Virus (Gross) in Genital Organs of Virus-injected C3Hf Mice and of AK Mice

Dorothy G. Feldman and Ludwik Gross


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