Lipopigment Fine Structure in Human Seminal Vesicle and Prostate Gland Epithelia*

G. Aumüller
Anatomisches Institut der Universität, Robert-Koch-Str. 6
D-3550 Marburg, Federal Republic of Germany

Summary. The fine structure of lipopigments normally found in prostatic and seminal vesicle epithelial cells of elderly men is described and compared to findings in human fetal and hypophysectomized rat accessory sex glands. In the prostate gland lipopigments are supposed to be a sign of reduced metabolic activity, whereas in the seminal vesicle lipopigment formation seems to indicate not only high functional activity but also regressive changes.

Key words: Human — Male — Accessory sex glands — Electron microscopy.

Introduction

Lipopigment within human accessory sex gland epithelium has been described by many light microscopists (Maass, 1889; Langerhans, 1875; Oberndorfer, 1901; Akutsu, 1903; Namba, 1911; Ishihara, 1914), and consideration has been given to its possible origin in (1) digested sperm residuals, (2) resorptive activity, (3) hormonal imbalance, (4) secretory function, and (5) pathological conditions (Kurosawa, 1930; Oberndorfer, 1931; Watzka, 1943; Pretl, 1948; Rather and Arnold, 1956; Cavazos et al., 1964; Riva and Stockwell, 1969; Mainwaring and Brandes, 1974).

Although a series of ultrastructural analyses of the human prostate gland (Harkin, 1963; Brandes, 1966; Brandes, 1974) and seminal vesicle (Riva, 1967) do exist, no detailed study has been made of the fine structure of lipopigments normally occurring in prostatic and seminal vesicle epithelium of elderly men. The questionable role of lipofuscin granules in normal, hyperplastic, and carcinomatous prostatic tissue (Müntzing and Nilsson, 1972; Ablin et al., 1973) provided further stimulus to investigate the fine structure of lipopigments in human accessory sex gland epithelium.

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Materials and Methods

Prostatic and seminal vesicle tissue samples were collected (courtesy of Dr. Hess, Salem Hospital, Heidelberg) from 12 patients aged 48 to 62 years who were suffering from benign prostatic hyperplasia or prostatic carcinoma during prostatectomy. Fixation was done for 4 to 6 h in buffered paraformaldehyde-glutaraldehyde solution (Karnovsky, 1965) at room temperature. After postosmication for 2 h in buffered 1% OsO₄ solution, specimens were dehydrated in a graded series of ethanol and propyleneoxide, and embedded in Epon. Semithin sections were cut on a Porter-Blum ultramicrotome with glass knives and checked for pathological changes in the epithelium. Within some carcinomatous specimens, areas of intact prostatic tissue could be detected. Only these intact areas and the quite normal seminal vesicle tissue were used for electron microscopy. Thin silver- to grey-colored sections were cut on a LKB ultrotome, stained with uranyl acetate and lead citrate, and examined in a ZEISS EM 10 electron microscope.

For the purpose of comparison, prostatic and seminal vesicle tissue from a human fetus of 215 mm crown-rump-length and from rats hypophysectomized for 30 days were prepared in the way described above and analyzed with the electron microscope.

Results

a) Prostate Gland

In prostatic epithelial cells lipopigments are mainly located in the basal and supranuclear regions (Fig. 1 a). Two different appearances of lipopigment can be distinguished: (1) conglomerates of myelin figures and finely dispersed granular electron-dense material (Fig. 1 b), and (2) electron-translucent drops of varying size with an electron-opaque and sometimes cap-like rim (Fig. 1 c and d). No relations of these deposits and primary lysosomes or multivesicular bodies were observed.

The first form of lipopigment is infrequent. Its most striking features are the regularly arranged myelin figures interspersed among clumps of granular electron-dense material, which are membrane-bounded. These inclusions closely resemble the residual bodies seen in the ventral prostate gland epithelium of rats hypophysectomized for 30 days. It therefore may be interpreted as a residual body, probably of autophagic origin.

b) Seminal Vesicle

Lipopigments abound within the human seminal vesicles of elderly men. No preferred location site is observed, although basally the inclusions are less complicated in arrangement and often consist of single membrane-bounded droplets (Fig. 2a). Size and internal arrangement of lipopigment differ slightly: small (1–3 μm) membrane-bounded droplets with or without electron-dense inclusions (Fig. 2 b, arrow), medium sized (4–6 μm) membrane-bounded bodies with polymorphic contents (Fig. 2 c), and large (5–10 μm) free or membrane-bounded bodies with honeycombed internal structures (Fig. 2 b and d) are encountered.

The small, usually homogeneous granules are found in nearly every cell of the epithelium and are often hard to distinguish from primary lysosomes, which are also common in this cell type. The round and, in the first instance, homogenous and small droplets seem to demarcate delicate circular internal