Electron-Histochemical Location of Cathepsin D and Elastase in the Uterus

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Location of cathepsin D and elastase in rat uterus was studied by electron-histochemical method. Activities of both proteinases in the myometrium was detected in lysosomes of smooth-muscle cells, macrophages, and fibroblasts.

Key Words: *cathepsin D; elastase; uterus; electron histochemistry*

Cathepsin D is present in different cells and tissues. This proteinase most actively functions at acid pH (2.8-5.0) [2]. This aspartic proteinase reflects cell capacity to protein cleavage and plays an important role in intracellular proteolysis [3]. The enzyme can cleave a variety of proteins, among which are the main components of the extracellular matrix: collagen, proteoglycans, and glycoproteins [7]. In the only report devoted to the location of cathepsin D in the uterus the enzyme was immunohistochemically detected in lipid-rich residual bodies in the myometrium [13].

Elastase is a serine proteinase with the optimum pH 8.0-8.5 [4]. This enzyme actively participates in various physiological and pathological processes. Apart from cleavage of the components of extracellular matrix, elastase stimulates the expression of tissue factor in human endothelial cells [6] and is the key component of the so-called proteolytic system initiating activation of the blood plasma proteolytic system [12]. This enzyme plays an important role in the regulation of cytokine production during inflammation [1]. Elastase of azurophilic granules in circulating polymorphonuclear leukocytes participates in intraphagosomal degradation of immune complexes [9]. The enzyme was detected immunohistochemically in neutrophils, monocytes, and alveolar macrophages [9,10] and biochemically in skin fibroblasts [5]. All these studies were carried out *in vitro*.

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We studied the location of cathepsin D and elastase in the uterus at the ultrastructural level.

MATERIALS AND METHODS

The uterus of virgin rats was examined. The animals were decapitated under ether narcosis. The material was histochemically stained for cathepsin D and elastase activities as described previously [11] using Bz-Arg-Gly-Phe-Pro-4MβNA and Glutaryl-Ala-Ala-Ala-4MβNA (Bachem) as substrates for cathepsin D and elastase, respectively. The location of cathepsin D in the uterus was studied also during its postpartum involution (2 and 3 days postpartum). Control sections were incubated in a substrate-free medium. Ultrathin sections were not contrasted.

RESULTS

Electron-histochemical study of the myometrium from virgin animals and on 2 and 3 days postpartum showed intense reaction to cathepsin D in lysosomes of smooth-muscle cells (SMC; Fig. 1, *a*), macrophages (Fig. 1, *b*), and fibroblasts (Fig. 1, *c*).

Examination of the myometrium from virgin rats revealed product of elastase reaction in the form of small granules in lysosomes of some SMC (Fig. 1, *d*), macrophages (Fig. 1, *e*), and fibroblasts (Fig. 1, *f*). Low extracellular activity of the enzyme was also detected: solitary granules of the reaction product were seen on the cytolemma of some SMC and macropha-

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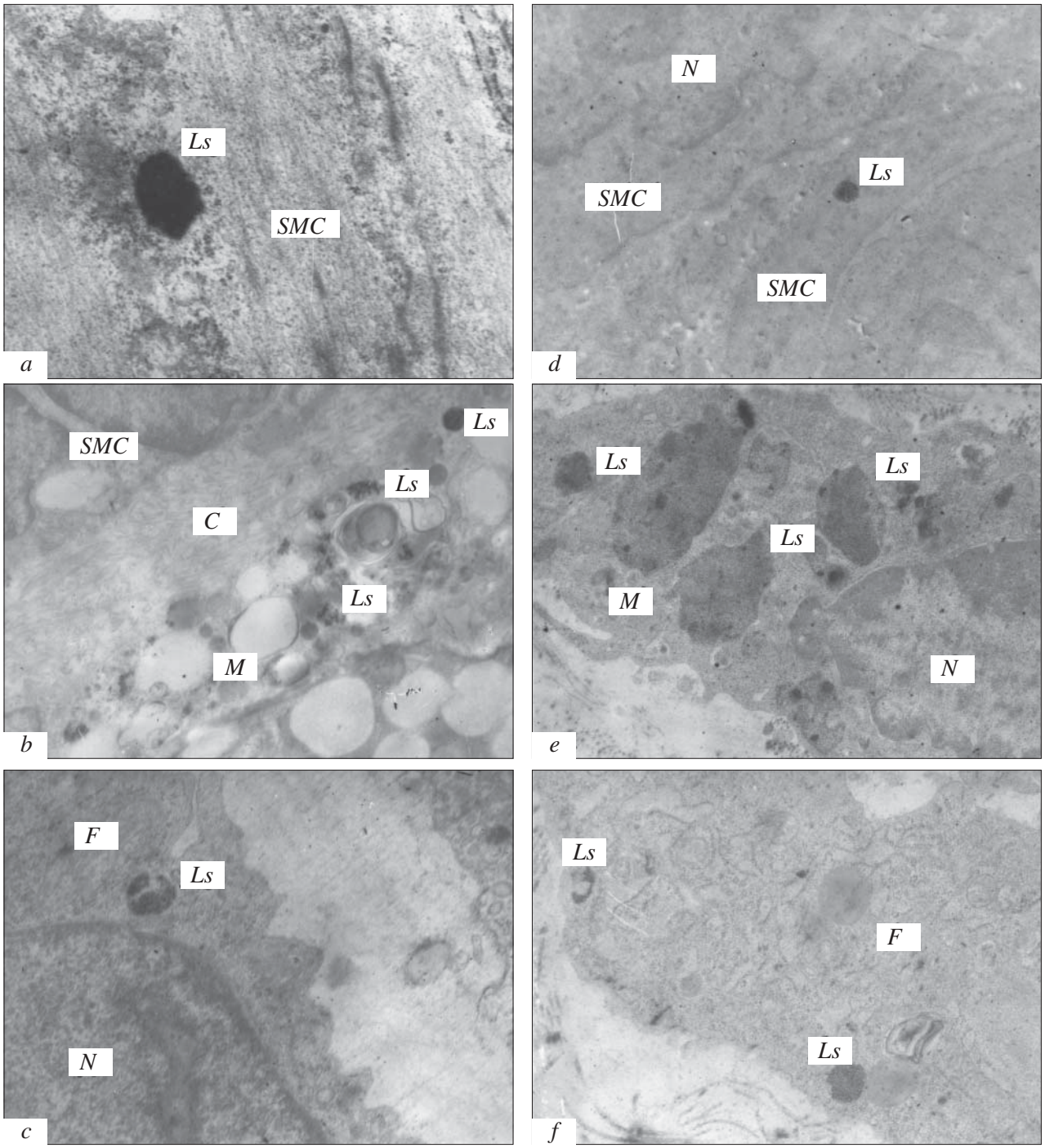

Fig. 1. Location of cathepsin D and elastase in the rat uterus. *a*) intense reaction to cathepsin D in the smooth-muscle cell lysosome, ×20,000; *b*) 2 days postpartum: reaction to cathepsin D in macrophage lysosomes and phagosomes, ×8000; *c*) reaction to cathepsin D in fibroblast lysosomes, ×10,000; *d*) reaction to elastase in smooth-muscle cell lysosome, ×8000; *e*) reaction to elastase in macrophage lysosomes and phagosomes, ×6000; *f*) reaction to elastase in fibroblast lysosomes, ×10,000. *SMC*: smooth-muscle cell; *Ls*: lysosome (and phagosome); *M*: macrophage; *C*: collagen; *F*: fibroblast; *N*: nucleus.

ges. In control sections no cathepsin D and elastase reaction products were detected.

Hence, both cathepsin D (in virgin animals and during postpartum involution of the uterus) and elastase are present in lysosomes of SMC, macrophages, and fibroblasts.

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