It has been shown that equine insect hypersensitivity “Kasen” has the characteristics of Type I and Type IV allergic dermatitis [5] and that Langerhans cells (LCs), which are skin accessory cells, are important in the pathogenesis of “Kasen” [6, 7]. In the course of pathological observations of “Kasen” skin lesions, we identified LCs within the follicular epithelium (FE) and intradermal sweat duct (ISD) of equine “Kasen”. By light microscopy, LCs were present in the greatest numbers within the FE and ISD than within the epidermal layer and the normal skin, with an occasional formation of several aggregated foci. By electron microscopy, LCs within the FE and ISD widely extended their dendritic processes between the keratinocytes and contained Birbeck granules (Bgs), mitochondria, rough endoplasmic reticula and ribosomes in the cytoplasm. Numerous Type 2 LCs, with a number of Bgs and endocytosis, and Type 3 LCs, with multivesicular bodies and endosomes of various sizes, were recognized within the FE and ISD, although inactive Type 1 LCs, with a narrow and lucid cytoplasm, were rarely seen. LCs observed within the FE and ISD in the “Kasen” skin lesions might express the particular stage corresponded to recognize, intake and process the antigens which permeate them. LCs within the FE were consistently present within the skin, with an occasional formation of several aggregated foci. LCs within the FE were rarely observed. Within the epidermal layer in

Langerhans Cells within the Follicular Epithelium and the Intradermal Sweat Duct in Equine Insect Hypersensitivity “Kasen”

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ABSTRACT. Histopathologic and electron microscopic observations were given on Langerhans cells (LCs) within the follicular epithelium (FE) and intradermal sweat duct (ISD) of equine “Kasen”. By light microscopy, LCs were present in the greatest numbers within the FE and ISD than within the epidermal layer and the normal skin, with an occasional formation of several aggregated foci. By electron microscopy, LCs within the FE and ISD widely extended their dendritic processes between the keratinocytes and contained Birbeck granules (Bgs), mitochondria, rough endoplasmic reticula and ribosomes in the cytoplasm. Numerous Type 2 LCs, with a number of Bgs and endocytosis, and Type 3 LCs, with multivesicular bodies and endosomes of various sizes, were recognized within the FE and ISD, although inactive Type 1 LCs, with a narrow and lucid cytoplasm, were rarely seen. LCs observed within the FE and ISD in the “Kasen” skin lesions might express the particular stage corresponded to recognize, intake and process the antigens which permeate them. KEY WORDS: equine, insect hypersensitivity, Langerhans cell.
"Kasen" skin lesions, Type 1 LCs were scattered diffusely throughout the lesions, Type 2 LCs mostly in the upper spinous stratum, and Type 3 LCs mostly in the epidermo-dermal junction. In normal skin, although LCs were occasionally observed, Type 2 and 3 LC were rarely identified.

As mentioned previously, the three types of LCs can be characterized as follows: Type 1 LC, which is confirmed by the presence of a small number of Bgs in narrow cytoplasm, represents the morphology before antigen intake; Type 2 LC, which has a number of Bgs of various shapes and presents endocytosis, represents the morphology at the time of antigen intake; Type 3 LC, which contains a remarkable number of vesicles (multivesicular bodies) and high electron-dense granular endosomes of various sizes, represents the morphology after antigen intake. In other words, most LCs (Type 2 LC and Type 3 LC) within the FE and ISD are in the process to treat antigen, and Type 1 LC is in the rest phase. Previous reports mentioned that there were enlarged LCs surrounding and, extending their dendrites toward the follicle in trinitrochlorobenzene-sensitized mice and in 2, 3- epoxypropyl trimethyl ammonium chloride-sensitized humans [1, 4]. The kinetics of LCs under these pathological conditions suggest an important role of the hair follicle as a shunt pathway for the permeation of contact allergens through the skin, i.e., the FE probably contains a much greater amount of antigen than the surrounding epidermis.

In conclusion, a great number of LCs observed within the FE and ISD in “Kasen” skin lesions might express the particular stage corresponded to recognize, intake and process antigens which permeate through the skin.

Equine insect hypersensitivity represents Type I and Type IV hypersensitivity reactions. It is certain that salivary antigens from various blood sucking insects are a major cause of this disease [9]. However, multiple antigens may be involved in the pathogenesis. Several molds and a few grasses gave positive reactions to the skin test in horses [2]. Some investigators believe that grain mill dust, cottonseed, and alfalfa antigens may be primary irritants in horses [9]. Chronic scratching against fences may promote to collect multiple antigens within the FE and ISD and permeate them through the keratinocytes. From this report, it is indicated that the FE and ISD are possible shuntways for allergens, grasses and molds, in addition to blood sucking insects, and may be a potent pathway to promote equine insect hypersensitivity.

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Fig. 1. Langerhans cells (LCs) within the follicular epithelium (FE). LCs (arrows) can be readily distinguished from the surrounding keratinocytes by virtue of the clear cytoplasm. Toluidine blue staining. × 345.
Fig. 2. LCs within the intradermal sweat duct (ISD). LCs expand their dendritic processes to the sweat duct (arrows). Toluidine blue staining. × 548.
Fig. 3. Type 3 LC within the FE. LCs have a few Bgs, vesicles (arrows), and endosomes (arrowheads) in the cytoplasm. TEM. Uranyl acetate and lead citrate. × 4,100.
Fig. 4. Type 2 LC within the FE. Bgs associated with endocytosis caused by cell membrane depression (inset A, arrowheads), showing a rod-like structure with a linear center and sometimes a bulb at one end or in the center (inset B, arrows). TEM. Uranyl acetate and lead citrate. × 7,050; inset A: × 15,000; inset B: × 12,700.