

NEUROENDOCRINE AND MAST CELLS OF THE SKIN IN THE AREA OF ACUPUNCTURE

E.A. Guryanova, E.S. Deomidov

Department of Internal Diseases, Chuvash State University n.a. I.N. Ulyanov, Cheboksary, Russia

НЕЙРОЭНДОКРИННЫЕ И ТУЧНЫЕ КЛЕТКИ КОЖИ В ОБЛАСТИ ТОЧЕК АКУПUNKТУРЫ

Е.А. Гурьянова, Е.С. Деомидов

ФГБОУ ВО «Чувашский государственный университет им. И.Н. Ульянова», Чебоксары

Objective. We studied mast cells and neuroendocrine cells of the skin of adults in the area of the acupuncture points (AP) and outside them. **Material and methods.** Using the Unna method (polychrome toluidine blue dye), mast cells were detected in the skin. Conducted immunohistochemical study using monoclonal antibodies to neuron-specific enolase and synaptophysin in order to identify neuroendocrine cells. **Research results.** Analyzed data on the distribution of mast cells in the skin in the area of the acupuncture points in an adult. It was revealed that the distribution of mast cells in the dermis and the hypodermis differs depending on the localization of the acupuncture point. Fat cells take in maintaining homeostasis and regulation of metabolism in the skin. NSE- and synaptophysin-positive cells were detected in the basal layer of the epidermis, in the area of the the muscles that raise the hair, in the area of the hair follicles; in the secretory terminal regions of the sweat glands, as well as outwards from the basement membrane of these regions between the myoepithelial cells. A part of the neuroendocrine cells is in contact with nerve waves. Expression of NSE and synaptophysin depends on AP localization. In AP of the skin of the abdomen and upper limb, a more pronounced expression of NSE and synaptophysin is observed than at the acupuncture points of the skin of the face. The expression of NSE in the structures of the skin in the area of the acupuncture points is more pronounced than the expression of synaptophysin. In the dermis revealed structureless spaces surrounded by mast cells, nerve fibers, blood vessels.

Keywords: neuroendocrine and mast cells; acupuncture points; skin.

Цель исследования — изучить тучные и нейроэндокринные клетки кожи взрослого человека в области акупунктурных точек и вне их. **Материал и методы.** Методом Унна (окраска полихромным толудиновым синим) выявляли тучные клетки в коже. Проводили иммуногистохимическое исследование с использованием моноклональных антител к нейронспецифической энолазе и синаптофизину с целью выявления нейроэндокринных клеток. **Результаты исследований.** Проанализированы данные о распределении тучных клеток в коже в области точек акупунктуры у взрослого человека. Выявлено, что распределение тучных клеток в дерме и гиподерме различается в зависимости от локализации точки акупунктуры. Тучные клетки принимают в поддержании гомеостаза и регуляции метаболизма в коже. Выявлены NSE- и синаптофизинположительные клетки в базальном слое эпидермиса, в области мышц, поднимающих волос, в области волосяных фолликулов; в секреторных концевых отделах потовых желез, а также снаруж от базальной мембраны этих отделов между миоэпителиальными клетками. Часть нейроэндокринных клеток контактирует с нервными волокнами. Экспрессия NSE и синаптофизина зависит от локализации ТА. В ТА кожи живота и верхней конечности наблюдается более выраженная экспрессия NSE и синаптофизина, чем в точках акупунктуры кожи лица. Экспрессия NSE в структурах кожи в области точек акупунктуры более выражена, чем экспрессия синаптофизина. В дерме выявлены бесструктурные пространства, окруженные тучными клетками, нервными волокнами, кровеносными сосудами.

Ключевые слова: нейроэндокринные и тучные клетки; точки акупунктуры; кожа.

Introduction. Mast cells are present in the skin in the dermis and hypodermis and are in contact with blood and lymphatic vessels and nerve terminals. Mast cells release into the environment as a result of the degranulation process biologically active substances, many of which play a significant role in the regulation of physiological processes in tissues. The main aspect of the regulatory function of mast cells is their role as mediators between the nervous and immune systems. Mast cells are activated by neurotransmitters that allow neural control of the immune system and secrete neurotransmitters and neurotrophic factors that directly affect

the nerves, causing acute activation or long-term changes in excitability and phenotype. Studies of mast and neuroendocrine cells can provide a better understanding of how the immune and nervous systems coordinate many aspects of homeostatic control. The aim of the study is to identify the distribution of neuroendocrine and mast cells in the skin in the area of the acupuncture points.

Material and methods. Researched skin sections obtained as a result of face-lifting surgery. To identify mast cells in the skin and to determine the degree of sulfation of heparin, the Unna method was used (dyeing with polychrome toluidine blue).

Neuroendocrine cells were detected in human skin by immunohistochemistry, using monoclonal antibodies to neuron-specific enolase and synaptophysin.

Results and discussion. In the study of sections of the skin in the area of the acupuncture points registered a significant increase in the number of mast cells compared with areas of the skin outside of acupuncture points. The mast cells located in the subepithelial region were orthochromic stained and had small sizes. According to morphological criteria, two mast cell populations are detected: one of small sizes from 5.4 to 7.1 μm , with the presence of blue nuclei, orthochromically stained, are located subepithelially; others have a diverse spindle-shaped, polygonal shape, with a centrally located nucleus up to 16 μm , large, localized at the border of the dermis and hypodermis, most of them have gamma-metachromatic coloring. Most of the mast cells are represented by solid forms (72%), partially (19%) and totally (9%) degranulated cells were also detected. In the dermis revealed structureless spaces, near which there are mast cells, adipocytes, nerve fibers and blood vessels.

The number of neuroendocrine cells determined by immunohistochemistry was significantly different at different points of acupuncture in humans. The largest number of cells immunopositive to neuron-specific enolase and synaptophysin was found at points located on the anterior abdominal wall.

The greatest number of neuroendocrine cells was found in the region of the secretory regions of the sweat glands and in the epidermis. NSE is actively expressed by some keratinocytes of the basal layer, in the region of the muscles that raise the hair, in the region of the row of hair follicles: outwards from the cells of the epithelial sheath in the region of the hair follicle. The secretory epithelial cells of the terminal sections of the sweat glands, and the cells lying outwards from the basement membrane of these sections between the myoepithelial cells, are in contact with the immunopositive nerve fibers. The expression of NSE and synaptophysin depends on the region of the body. A more pronounced expression of NSE and synaptophysin is observed at the acupuncture points of the abdominal and upper limb skin than at the acupuncture points of the face. The expression of NSE in the structures of the skin in the area of the acupuncture points is more pronounced than the expression of synaptophysin.

Conclusion. Thus, the topographic and functional connection of skin TK with the nerve terminals and blood vessels allows us to make an assumption about their important role in the neurotransmitter regulation of skin homeostasis. The presence of neuroendocrine cells in the area of the the sweat glands indicates their role in the mechanisms of regulation of electrical resistance and maintenance of continuum homeostasis in the area of the acupuncture points.

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