

THE EFFECTS OF THE USE OF STEM CELLS IN VARIOUS DISEASES

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Stem cells today heard everywhere. They try to cure various diseases, and, according to press reports, they work miracles. "Able to turn into any tissue, they found" weaknesses", restoring the fabric of vessels, glands, muscles, nerves or wrinkles disappear, there is a burst of energy ..." - read the advertising press releases. In short, in modern medicine - a rational, analytical, divided into many branches, specialties, he returned the ancient image of a panacea. Even wonder why the stem cells have not cured all the world of disease and not forced out of circulation all the old drugs. What actually are these wondercells and what they can do?

AIM: the investigation was studying the significance of learning of stem cells. At the very beginning of XX century it was known that mature blood cells are unable to breed, and the most numerous of them - red blood cells - even lose their nucleus together with all the chromosomal apparatus. This, of course, an extreme case, but in general a waiver of the production of a similar characteristic of most specialized cells in the human body - muscle, glandular, nervous. But if the neurons, or, say, the egg can live for decades, the red blood cells - about one hundred days. However, less than their while not becoming. Where did they come from?

METHODS AND MATERIALS: In the 1900's well-known histologist, Professor of Military Medical Academy, St. Petersburg, Alexander Maximov investigated the development of blood cells and created a fairly consistent theory. According to her in the red bone marrow cells live special, the only thing that - to share. After each division, as it should be, obtained by two identical young cells. But in one of them starts morphological changes, which resulted in it becoming one of the blood cells. The other, grown up to the desired size, divided again - and again one of its two subsidiaries pursue careers blood cells, while the other took the "mother". One can imagine that the dividing cells as would constitute a barrel, from which in each cycle to the side branches diverge - cells acquire the specialization. Apparently, therefore, Maksimov, stating in 1909, his discovery at a meeting of hematology society in Leipzig, called the "mother of all cells, blood cells Stamzelle, ie the stem.

In fact, the existence of stem cells was "opening at the tip of the pen": neither Maksimov, nor anyone else at that time did not see them, rather, could not distinguish among the numerous and diverse cell "population" of

bone marrow. Later, the theory was direct evidence, but for a long time it was thought that such cells are specific to the hematopoietic tissue, by which blood is continuously updated. But the constant change of cellular composition - is a necessary condition for the existence of any epithelium, the lining of the nasopharynx to the upper skin layer (which is why the tattoo have to drive under it - or even the most resistant paint in a few days come alive along with his "canvas"). The basis of this continuous renewal is the same mechanism: some descendants of dividing unspecialized cells acquire specific properties. It is estimated that over 70 years of his life stem cells in a regularly updated tissues produce a total of about 14 tones of live weight. And on blood cells make up only one-fifth of this amount, the lion's share of the same (about two-thirds) are constantly generated and lost by the flesh of the epithelium of the intestine.

Muscles and vessels of constant renewal seems to be not required, but in certain circumstances, for example, in trauma or under the influence of regular physical activity, they also use this function. Most, apparently, not prone to bone regeneration humans and other mammals still accrete after fractures, filling the gap of the newly formed bone tissue. And in all these cases, the new tissue is not formed due to division of specialized cells, but at the expense of differentiation (the so-called process of cell specialization) of the descendants of dividing cells that are found there in all these tissues. Sometimes they have special names: the cells that can turn into muscle tissue, called myoblasts, to the bone -osteoblasts and etc. The total of their name - tissue stem cells. It reflects their main feature - the ability to develop into any cell type specific tissue, usually the one in which or near which this stem cell lives.

However, even in 1960 the Soviet hematologist Alexander Fridenshtein found in the same bone marrow among the normal hematopoietic stem cells a small number of more plastic. In experiments Fridenshtein and his staff of these cells (mesenchymal he called them) were transformed into cartilage, bone, adipose tissue and seems to give rise to any of the approximately 230 cell types of the human body. And could not give: a laboratory Fridenshtein they have learned to multiply indefinitely "in vitro" (more precisely, in Petri dishes), so that one cell grew an entire colony, but its members remain stem cells.

Abroad, these works have not noticed. Impacted the increasing isolation of Soviet science. Much later, these cells were "rediscovered" by American scientists, who named their stromal. Discoverer of universal stem cells died in 1998, and about the same time started the current boom around the cell therapy.

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