Some of the most serious medical conditions, such as cancer and developmental defects, are the result of pathological division and cell differentiation. Understanding the genetic and molecular regulators of these processes can provide information on how these diseases occur and offer new strategies for therapy. A significant obstacle to the use of IC is the fact that signals that contribute to the transition of certain genes to the active and inactive state, as well as those affecting the differentiation of stem cells, are not fully elucidated.

Perhaps the most important potential use of human stem cells is the recovery of cells and tissues that could be used for cellular te-rapia. To date, donor organs and tissues are often used to change the diseased or damaged tissue, but the need for tissues and organs for transplantation exceeds their available supply. Stem cells, aimed at differentiating into certain types of cells, allows to restore sources of cell and tissue replacement for the treatment of diseases, in particular Parkinson's and Alzheimer's, spinal cord injury, bruising, burns, heart disease, diabetes, osteoarthritis and rheumatoid arthritis.

For example, it is possible to create healthy cells of the heart muscle in a laboratory with subsequent transplantation in patients with chronic heart failure. Previous studies in mice and other animals indicate that bone marrow stem cells that have been transplanted into a damaged heart can create heart muscle cells and successfully re-enter the heart tissue. Other recent studies in cell cultures indicate the possible targeting of differentiated embryonic stem cells or mature bone marrow cells to heart muscle cells.

In people with type 1 diabetes, pancreatic cells, which usually produce insulin, are damaged by their own immune system. New research suggests that it is possible to direct differentiation of human embryonic stem cells in a cellular structure in order to form insulin-producing cells that could be used in transplant therapy for patients with diabetes.

Consequently, for stem cell transplantation, the following properties should be present:

- Extensively proliferate and produce a sufficient number of tissues;
- differentiate into the desired cell types;
- maintain viability after transplantation;
- connect with surrounding tissues after transplantation;
- function to prolong the life of the recipient;
- do not harm the recipient in any way.

Conclusions. Thus, treatment with stem cells is perspective. their use is limited by technical reasons and high cost, but the accumulated results make it possible to assume that these limits will be overcome.

PHAGE TYPING AND ITS USES. THE EXEMPLE OF PHAGE THERAPY

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Introduction. Phage typing is a laboratory technique used to determine and differentiate bacterial strains within a species according to their particular sensitivity to certain virulent bacteriophages. Bacteriophages are viruses that infect bacteria by attaching themselves to the bacterium then, penetrate its cytoplasm and multiply there leading to the bursting of the bacterial cell. They possess only one type of nucleic acid, either DNA or RNA, have no enzymatic systems for energy supply and are unable to synthesize proteins on their own. The emergence of bacteria resistant to antibiotics and the lack of therapeutic means have brought back to the front a tool that the West had forgotten: Phage therapy.

Aim. Bacteriophages are used in many areas such as medical and industrial to identify the layers of leaven for example. The search for phage is also an indicator of Fecal Contamination (water, food...). Bacteria can also be used as a way to identify other bacteria (phage typing). The sensitivity to bacteriophages can vary according to the strains of the same species. The use of a series of appropriately selected phages makes it possible to characterize lysotypes (a type within a bacterial species determined

by its reaction to specific phages.). In the ex-URSS, and more particularly in Georgia and Poland, phages are used to treat bacterial infections with or without the addition of antibiotic treatment. In many cases, phages are as effective as antibiotics and often even more, especially in cases of chronic infections since they target only a specific type of bacteria, leaving the useful ones in the body intact.

Materials and methods. Literature sources were collected for a profound analysis. Bacteriophages were discovered in 1892 by D. Ivanosky, a Russian botanist. In 1969, M. Delbrück, A. Hershey and S. Luria were awarded the Nobel Prize in Physiology or Medicine for their discoveries concerning «the replication mechanism and the genetic structure of viruses». In the beginning of the 20th century, phages were used to treat dysentery (an inflammatory disease of the intestine) and cholera. These phages were taken from the stools of the patients who made unexpected recoveries, as scientists thought there was something in them that could be used for healing. They then proceeded to purify their stools and inject the phages into the bodies of the suffering patients. Considering that bacteriophages are viruses, it is important to mention that they cannot survive on their own and therefore need hosts to be able to replicate and get out of the host cell. Firstly, the phage starts by recognizing the targeted bacteria and landing on it. The tail of the phage makes its way into the bacteria and injects its DNA in it. The DNA then proceeds to copying itself, making new phage shells, in which the newly-made DNA will be packed. The host bacteria is soon full of new phages. Lastly, the phages produce endolysin, a powerful enzyme that punches a hole in the bacteria, allowing the phages to be released outside to infect more bacteria.

Results and discussion. Phage therapy presents many benefits to modern human medicine. Given the rapidity of the multiplication of the phages and the number of clones resulting from each lytic cycle, it is logical to expect from phage therapy an intense and rapid bactericidal action, which is faster than that obtained by antibiotics. Bacterial resistance to phages is known as rare in vivo and particularly unbalanced. The effectiveness of this method for therapeutic use is thus expected to be stable over time. Insofar as our organism hosts phages, there is no reason for the tolerance of therapeutic phage solutions to be poor. The preparation of bacteriophages is a technically simple and cheap process, which means that it is within the reach of third world countries as well. Bacteriophages are derived from «dirty» water, which must be centrifuged, decanted and then passed through a filter that retains bacteria. Just a few hours of incubation at 35°C with gentle shaking are necessary to produce therapeutic phages in sufficient quantity. In spite of its advantages, phage therapy is still an unapproved process in most countries. It is officially authorized only in certain countries such as Poland, Georgia and Russia. Occasionally, it can be used in western countries like the United States of America, Canada, Germany and France, but only in cases of therapeutic impasses and in the context of compassionate use, based on the Declaration of Helsinki, under the sole responsibility of the physician in agreement with his patient. Also, it should be mentioned that there are limits to phage therapy as phages only target bacteria and cannot be used to treat fungal, parasitic and viral infections.

Conclusions. Considering the benefits brought by phage therapy, the world is starting to look more and more into this process. Indeed, the European Union invested 5 million euros in Phagoburn, a project that studies the use of phages to prevent skin infections in burn victims. In the USA, the FDA approved ListshieldTM, a food additive containing phages, that kills Listeria monocytogenes, one of the most virulent foodborne pathogens and one cause of meningitis. The relatively simple methods and the cheap cost of phage typing associated with its versatility might help propel it to fame in the years to come.