УДК 602.9:576.366
Student A. A. Maslakov
Scientific supervisor lecturer N. V. Ukrainets
(Department of intercultural communications and technical translation, BSTU)

ETERNAL YOUTH: A SCIENTIFIC APPROACH TO AGEING

Everyone would like to stay young and healthy. Despite human endeavours to escape or delay the process of aging, it seems to be an inevitable part of life. Ageing is a decline of biological functions of an organism and an increase of the probability of death. So, the purpose of the study is to determine the causes of ageing and the ways to overcome it. Research objectives: ageing processes in the human body. Ageing is known to be caused by biological mechanisms, which are sometimes called the "hallmarks of ageing". We suggested that there are means of combating them, at least to slow down senescence. Hypothesis: there are medicinal agents enabling preventively target ageing − the major risk factor for a wide variety of diseases and disabilities. To confirm or disprove the hypothesis, we studied the scientific discoveries and developments in the field of biology, biochemistry and medicine related to senescence.

Nature has given some species the opportunity to live without ageing and even be almost immortal. For example, Turritopsis dohrnii, also known as the immortal jellyfish, is able to change the stage of its life cycle. If the T. dohrnii jellyfish is exposed to environmental stress, physical assault, or is sick or old, it can revert to the polyp stage. Hydra stem cells have the capacity for endless self-renewal. Turtles and naked mole rats took a different path: in their body, the metabolism of old cells that have undergone cellular senescence is suppressed. Due to this, old cells do not poison their body.

So, are there any ways to fight ageing now?

Although human clinical trials have not yet been conducted, the results obtained from the animal experiments indicate the successful use of some drugs in the future. There are four main substances that are considered prospective in terms of anti-ageing.

1. Repurposed drugs. The advantage of such drugs is that they are already in clinical use for humans. The first is rapamycin, which was originally developed as an immunosuppressive. Rapamycin slows down ageing by inhibiting the protein mTOR, which regulates the process of protein production in cells. The second promising medicine is metformin. It supresses inflammation caused by senescent cells. Metformin also enhances protein recycling and improves mitochondrial function. It increases the ability of cells to produce energy and ensures a normal metabolism.

2. Senolytics. Their aim is to kill or modify the behaviour of senescent cells. This would prevent the accumulation of these cells in the body and could slow age-related physical deterioration.

3. Telomerase. Currently, two compounds show promise in activating the telomere repair enzyme telomerase, which prevents telomere shortening. This would ultimately prevent the formation of senescent cells in the first place.

4. Cellular reprogramming. Shinya Yamanaka won the Nobel Prize for Medicine in 2012 for cellular reprogramming. This method has already been tested on human cells in vitro and mice. The essence of this method is to lengthen telomeres, which leads to cell 'rejuvenation'. With proper control over the process, partial rejuvenation can be achieved. In this case, the cell will not lose its identity, that is, it will retain the function it performs in the organ.

Conclusion: improved health care, antibiotics and vaccines have reduced mortality and extended life expectancy around the world. In the future, there may be anti-ageing pills that we can take as a prophylactic to prolong life, but it will be decades before we fully understand the effect of these drugs and interventions.

REFERENCES

1. Stefánsson H. The science of ageing and anti-ageing. EMBO Rep. 2005 PMCID: PMC1369276.

2. Tosato M, Zamboni V, Ferrini A, Cesari M. The aging process and potential interventions to extend life expectancy. Clin Interv Aging. 2007 PMCID: PMC2685272.

3. Viña J, Borrás C, Miquel J. Theories of ageing. IUBMB life. 2007

УДК 621.315.592

Stud. K.V. Zapasnik
Sc. supervisor: senior lecturer J. I. Davydenko
(Department of intercultural communications and technical translation, BSTU)

THE END OF THE SILICON ERA

The purpose of this scientific work is to study and analyze promising technologies that can replace silicon materials in electronics and computer devices, in order to predict the end of the silicon era and develop new materials to create more efficient and powerful devices.

The Silicon Era, which began in the 1960s with the invention of the integrated circuit and gave rise to the digital age, may be coming to an end. While silicon-based chips have continued to shrink in size and increase in power, they are reaching physical limits that make further miniaturization difficult and expensive. Moreover, the demands of emerging technologies such as artificial intelligence, quantum computing, and 5G networks