

Multi-stage model of aging and carcinogenesis

Anisimov V.N.

*N.N. Petrov National Medical Research Center of Oncology, St. Petersburg, Russia
aging@mail.ru*

Key words: aging, carcinogenesis, multi-stage model

The current level of knowledge about the nature of aging allows us to approach the creation of a multi-level model of the multi-stage human aging process, taking into account the events that take place during the aging of organisms at different levels of integration: molecular, cellular, tissue, organ, system, organism and development of age associated pathology including cancer. The report formulates the main provisions of the multi-stage model of aging and carcinogenesis, as well as the principles of its construction, approaches to its verification and assessment of its predictive power. There are three levels of systems: homeostatic (whole organism), systemic and cellular-molecular-genetic. Definitions of normal and pathological aging are given, principles of interaction of systems of different levels are postulated. On the examples of manifestations of aging at different levels under the expose to factors, on the one hand, accelerating it (chemical carcinogens, ionizing radiation, some parasites, biological circadian desynchronization, alimentary obesity), and on the other hand, factors preventing accelerated aging and carcinogenesis (administration of melatonin, rapamycin, metformin etc.), possible approaches to using the model to predict the rate of aging and the duration of healthy life of a person and his populations living in different environmental conditions, or exposed to occupational factors accelerating aging, and evaluating the effectiveness of the use of certain means of preventing premature aging and carcinogenesis.

Acknowledgements: The study is supported by the Russian Scientific Foundation, grant No. 20-15-00330.

References

1. Anisimov V.N. Aging and cancer biology. In: Extermann M. (Ed.). *Geriatric Oncology*. Cham: Springer Nature Switzerland AG, 2020;91-109. doi: 10.1007/978-3-319-57415-8.
2. Anisimov V.N. Aging delay: of mice and men. *Acta Biomedica*. 2021;92(1):e2021073. doi: 10.233750/abm.v92i1.11273.