

AGING OF THE ORGANISM AS THE BEHAVIOR OF A COMPLEX SYSTEM OUTSIDE THE SUSTAINABILITY AREA

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The systems approach is useful for understanding the causes and mechanisms of aging, because the organism represents a complex system consisting of a hierarchy of cooperating subsystems. Since the functioning of subsystems is subordinated to general purposes and is coordinated and managed by the control systems of the organism a body functions as a single unit. The main idea proposed here is very simple. Even a potentially ageless body must start to age under inadequate condition (like a non-melting piece of ice taken out from the deepfreeze inevitably starts to melt at the temperatures above zero Celsius). This conclusion is consistent with patterns of mortality and with agelessness potential of somatic stem cells. Therefore, there is no need to build up and explore too complicated “*systems models of intrinsic aging*” to understand the origin of this mainly extrinsic root cause of natural aging. In our case a simple phenomenological black-box approach with *Input-Output analysis* is ample. Here *Input* refers to the environmentally dependent initial force of mortality, whereas *Output* is a rate of age-related increase of mortality force. If one takes into account the fact that robustness of really “sustainable” systems and modes is possible only in a certain limited range of ambient conditions, then the control theory and systems approach are sufficient both to discover the root cause of aging and to understand the underlying mechanisms of its implementation. After all, it is when leaving the area of adequate functioning modes determined by the environment that even potentially ageless immortalized cells and hydras start aging with the exponential growth of mortality, the mode typical for humans [1-3].

References

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