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Anti-aging drugs: where do we stand and where are we going?**Vaiserman A M**

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Taking into account the extraordinary complexity of mechanistic pathways underlying aging process, the recognition of these pathways and development of anti-aging interventions seems a challenging task. Significant progress, however, has been achieved in this research field during the past years. Efforts to increase healthspan through pharmacological agents and supplements targeting aging-related pathological changes are now in the spotlight of geroscience. The attempts to increase healthspan are currently focused on slowing the basic biological processes of aging such as cellular senescence, mitochondrial dysfunction, age-related decline of stress resistance, dysregulated cellular energy sensing/growth pathways, impaired proteostasis, deteriorated stem cell function/bioavailability, as well as inflammation/oxidative stress. A number of pharmacological agents targeting basic aging pathways to extend lifespan and healthspan (i.e., antioxidants, calorie restriction mimetics, autophagy inducers, etc.) are currently under investigation. Experimental studies have showed that extension of life span is usually accompanied by delayed or reduced morbidity including cardiovascular disease, neurodegeneration and tumors. Another way for anti-aging drug discovery is evaluating the pharmacological agents already approved by the FDA and other regulatory agencies for the treatment of particular conditions associated with aging, such as beta-blockers, metformin, statins, as well as anti-inflammatory medications. Supplementation with substances having anti-aging properties can, however, resulted in some cases in unfavorable effects as well. For example, in meta-analyses of observational studies and randomized controlled trials conducted in well-nourished and healthy populations, long-term antioxidant supplementation has been shown to be occasionally associated with undesirable consequences for the health and all-cause mortality. In a modern pharmacy, anti-aging is likely one of the most promising markets because the target group can potentially include each person. Current marketing research indicates that most people are willing to pay for long-term pharmacological therapy to prevent or delay the aging-related decline in physical and mental functions. Optimistic predictions of the feasibility of health- and life-extending interventions, however, should certainly be critically discussed in the light of their ethical, economic and social implications. Only after in-depth examination and following comprehensive debates, the implementation of such approaches in clinical practice will be possible.

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