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**THE POTENTIAL OF HYPERTHERMIA AND COLD EXPOSURE IN DELAYING
REPLICATIVE AGING**

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Cellular aging is accompanied by progressive shortening of telomeres, the terminal regions of chromosomes. This process limits the replicative potential of somatic cells. The key enzyme capable of counteracting this shortening is telomerase, the activity of which declines in most postmitotic tissues. The search for physiological and environmental modulators of telomerase activity is a significant challenge in gerontology.

In parallel, cell biology has extensively characterized stress proteins - heat shock proteins (HSPs) and cold shock proteins (CSPs). Expression of these proteins is induced by exposure to sublethal temperatures. These proteins function as molecular chaperones, protecting the proteome from denaturation and aggregation. However, evidence accumulated over recent years indicates their broader role, including the regulation of the telomerase complex.

The HSP90 protein is of particular interest. According to current research, it physically interacts with the catalytic subunit of telomerase (hTERT). This interaction is required for its proper folding and is essential for hTERT activity. This creates a theoretical possibility of modulating telomerase through the induction of HSPs by moderate physical stressors — hyperthermia (sauna, bath) and cold exposure (cold conditioning, cryotherapy). This phenomenon is consistent with the concept of hormesis, which states that mild stressors trigger adaptive protective mechanisms.

This paper analyzes the role of heat shock and cold shock proteins in the regulation of telomerase activity and evaluates the potential of sauna and cold exposure as accessible physical methods for inducing these proteins, which may have anti-aging effects.