

nucleobases occurs that can interact with the Ala-Glu-Asp-Gly groups. It was found that binding of six nucleotide pairs with TATATA of the DNthe A leading strand can be performed *via* an additional hydrogenous and one hydrophobic bond.<sup>24,78</sup> Thus, a regulatory peptide is believed to be able to bind with a complementary site on the gene promoter region, causing local separation of strands and thereby initiating the process of RNA polymerase gene transcription.

## 20.8 Conclusion

Physiologically active peptides, including short peptides, represent biologically active compounds that can modulate various cellular and molecular processes. Peptide compounds are essential for invention of new pharmaceutical products.<sup>83</sup> Peptide preparations are highly active, non-toxic and have no side effects, which comprise their main advantages as pharmaceuticals. Short peptides possess pronounced anticarcinogenic and geroprotective properties. In experimental studies in animals the peptides revealed the ability to decrease the risk of spontaneous and induced neoplasia and to enhance lifespan by 20–40%.<sup>14</sup> In general, these properties are determined by the peptides' capability to influence the immune system of the organism, thus preventing aging.<sup>21,54</sup> The peptides possess pronounced antioxidant potential: Vilon reduces the ROS level in *D. melanogaster* mitochondria; Epitalon inhibits the chemoluminescence level and enhances general antioxidant activity in mice blood serum.<sup>14</sup> Epitalon also has an inhibitory effect on the level of age-related chromosome aberrations in mice.<sup>22</sup> Short peptides activate heterochromatin in the cytoblasts of elderly patients and promote activation of genes repressed as a consequence of age-associated heterochromatinization of the euchromatic region of chromosomes.<sup>19</sup> Recognition of the short peptides' ability to influence the expression of various genes was essential for understanding of their role in the aging processes.<sup>23</sup>

Small peptides (di-, tri- and tetra-peptides) revealed the capability of complementary interaction with the DNA-specific binding sites on the promoter segment of genes, inducing separation of double helix strands and RNA polymerase activation. Discovery of the phenomenon of peptide activation of gene transcription allows determination of the mechanism to maintain physiological functions, which is based on the complementary interaction of DNA and regulatory peptides.<sup>24,79</sup>

Application of peptide bioregulators in humans for preventive purposes resulted in a significant restoration of the main physiological functions and a substantial mortality decrease in different age groups for a period of 6–12 years.<sup>26</sup>

Further investigation of the mechanisms of peptide geroprotective action can likely provide new avenues for peptidergic regulation of aging, prevention of premature aging, age-associated pathology and an increase in the period of active human longevity.