

of Vilon and Epitalon to female transgene mice led to a 1.9- and 3.7-fold decrease of gene HER-2/neu expression in mammary tumor, as compared to the control group. Moreover, Epitalon reduced the maximum size of mammary tumor and the diameter of lung metastases.<sup>64</sup>

Epitalon-treated culture of human lung fibroblasts manifested the induction of telomerase gene expression, telomerase activity and elongation of telomeres.<sup>65</sup> Activation of telomerase gene expression was accompanied by a 43% increase in the number of cell divisions.<sup>66,67</sup> These results are in accordance with our earlier data demonstrating the impact of particular peptide bioregulators and their complexes on gene expression.<sup>21</sup>

In the rat hypothalamic neurons, Vilon also was shown to stimulate the expression of *c-fos* gene known to be involved in the organism's stress response. Treatment with Epitalon also led to increased *c-fos* gene expression in the pineal gland of rats.<sup>9</sup>

One of the essential features of short peptides is their ability to influence cytokines synthesis. The expression of interleukin-2 (IL-2) in lymphocytes is known to decrease with aging.<sup>68</sup> The impact of Vilon on IL-2 gene expression in mouse spleen lymphocytes was studied by *in vitro* hybridization. Lymphocytes were stimulated with Con-A mitogen. Five-hour incubation with Vilon led to increased mRNA synthesis in both lymphoid cells stimulated with Con-A, and in non-stimulated cells. Prolonged Vilon incubation (for 20 hours) promoted IL-2 expression.<sup>69</sup> The effect of Epitalon on subcortex functions has also been found. Administration of Epitalon stimulated IL-2 gene expression in various hypothalamic structures under low stress conditions.<sup>67</sup> In general, our data provide evidence for immunomodulating and stress-protective capabilities of short peptides.<sup>9,67</sup>

The abovementioned experimental data on the mechanisms of action of the short peptides bring us to the conclusion concerning their important role in supporting immune, nervous, endocrine and other systems of the organism throughout the process of aging. These peptide preparations are able to inhibit the development of age-related pathologies, including cancer, thus preventing premature aging. It motivated us to examine their potential for treatment and prevention of age-related diseases in the elderly.

## 20.6 Application of Peptide Bioregulators in Elderly Patients

The experimental studies of peptide preparations in different animal models proved the safety of those preparations and revealed a wide spectrum of their beneficial effects, making reasonable the application of peptide preparations in humans. Most of the studies were conducted among elderly people and patients with premature aging.

The research was conducted among 106 patients ( $69 \pm 2$  years of age) with ischemic heart disease (IHD) and signs of premature aging: blood lipid disorders, low tolerance to carbohydrates, functional decrease of reproductive