

8.4.2 Antioxidants: Reliability-Theory Standpoint

The most efficient way to increase the systems reliability of complex systems is well-timed prevention of malfunctions (failures) of functional elements.^{13,15,18,19} Following this reliability-theory guide-line, it was proposed^{11,12} that antioxidants provide preventive protections from free radicals *in vivo*. In this regard, the particular protection mechanisms may be different for antioxidants of different types. For BHT, it was found that this antioxidant prevents generation of $O_2^{\cdot-}$ radicals as by-products of electron transport in mitochondria. In a study of low-temperature ESR (electron spin resonance) signals of rat tissues, we found that BHT increases the myocardium oxygenation.⁵⁴ It is known that hypoxia results in structural damage in mitochondrial membranes resulting in considerable decrease in the reliability of electron transport, so that the mitochondria become generators of intense $O_2^{\cdot-}$ fluxes.⁵⁵ It stands to reason that BHT prevents the development of hypoxia by increasing the degree of myocardium oxygenation that prevents the transformation of mitochondria into $O_2^{\cdot-}$ generators.

Furthermore, BHT produces the dramatic hormonal changes in the animal's blood. Figure 8.2 demonstrates the increase of corticotropin and

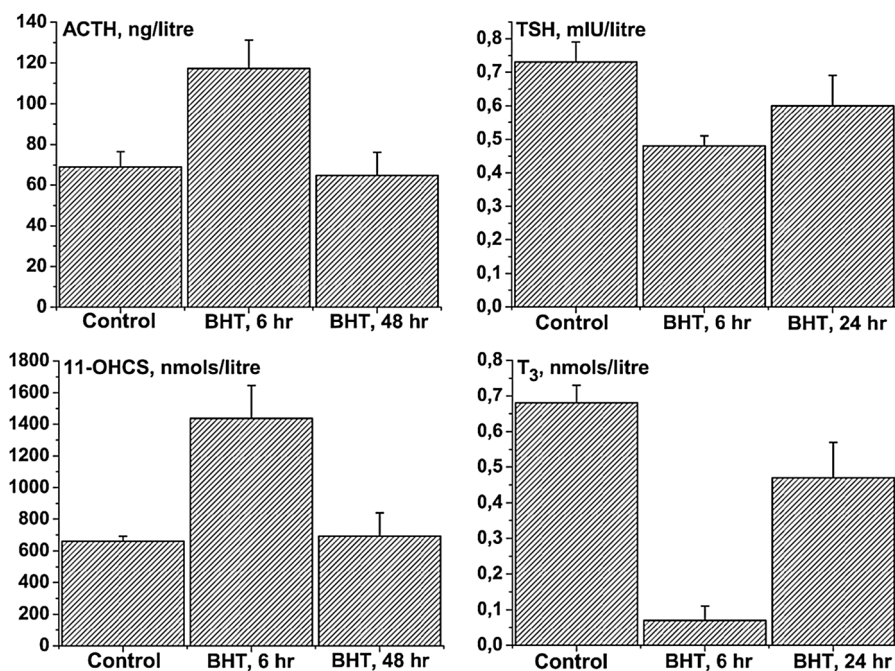


Figure 8.2 Concentrations of corticotropin (ACTH), thyrotropin (TSH), 11-oxycorticosteroids (11-OHCS) and L-3,3',5-triiodothyronine (T_3) in blood plasma of rats (adult, 4–6 months, male Wistar) in control and after injection of antioxidant BHT (data compiled from ref. 57).