



**Scheme 8.1** Synthetic antioxidants BHT (2,6-di-*tert*-butyl-4-methylphenol), Emoxipine (2-ethyl-3-hydroxy-6-methylpyridine hydrochloride), MitoVit E, Mito-Q, and SkQ. Me = CH<sub>3</sub>-group.

literature, first found wide use as stabilizer for industrial oils and edible fats. The antioxidants based on alkyl-substituted hydroxypyridine, such as 2-ethyl-3-hydroxy-6-methylpyridine hydrochloride (Emoxipine), are water-soluble, unlike BHT.<sup>8,38,40</sup> The antioxidant derivatives of vitamin E and ubiquinone, the so-called MitoVit E and Mito-Q, also contain in addition to the hydrophobic antioxidant group a lipophilic cationic group.<sup>41</sup> The mitochondria-targeted plastoquinone compounds with rhodamine and a triphenylphosphonium as cations (SkQ) were also synthesized.<sup>42</sup> Owing to the electric charge of the cation, these molecules are presumed to use the mitochondrial transmembrane potential to pass through the mitochondrial membranes and get into mitochondria, just those organelles that generate the highest amount of ROS.<sup>41,42</sup>

There are plenty of natural antioxidants starting from “classical”  $\alpha$ -tocopherol (vitamin E) and ascorbic acid (vitamin C). Most natural antioxidants are substituted phenols or polyphenolic compounds, which, owing to their hydroxyl groups, are capable of inhibiting free-radical chain oxidation reactions in model systems (*in vitro*), for example, oxidation of linolenic acid. Among antioxidants, even melatonin and other human and animal hormones and even amino acids and peptides are mentioned sometimes.<sup>43</sup> Most functionally substituted phenols and polyphenols are of plant origin. These are quercetin, flavones and other flavonoids, simple catechols, which are present in large amounts in green tea, and catechol oligomers present in high concentrations in grapes, cocoa beans, *etc.*, carotenoids, tannins, anthocyanins, coumarins, hydroxycinnamic acid derivatives, and resveratrol, which is